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Report to the Chairman, Subcommittee
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Resources, Committee on Government
Operations, House of Representatives

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HAZARDOUS WASTE SITES

State Cleanup Status and Its Implications for Federal Policy

GAO

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Resources, Community, and
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The Honorable Mike Synar
Chairman, Subcommittee on Environment,
Energy, and Natural Resources
Committee on Government Operations
House of Representatives

Dear Mr. Chairman:

As requested, we are reporting on the status of state cleanups of hazardous waste sites not on the National Priorities List (NPL) and the cleanup standards planned for selected non-NPL sites. The report also contains our views on the Environmental Protection Agency's proposed "deferral" policy, which would allow states to manage the cleanup of some NPL sites.

Unless you publicly release its contents earlier, we will not make this report available to other interested parties until 30 days after the date of this letter. At that time we will send copies to the appropriate congressional committees; the Administrator, Environmental Protection Agency; and the Director, Office of Management and Budget. We will also make copies available to others upon request.

This work was performed under the general direction of Richard L. Hembra, Director, Environmental Protection Issues. Major contributors are listed in appendix VI.

Sincerely yours,

J. Dexter Peach
Assistant Comptroller General

Executive Summary

Purpose

Of the thousands of sites contaminated by hazardous waste around the country, only about 1,200 are targeted for cleanup under the Environmental Protection Agency's (EPA) Superfund program. Although federal law does not require cleanup of non-Superfund sites or set cleanup standards for them, many states have begun cleanups under their own programs. The Chairman, Subcommittee on Environment, Energy, and Natural Resources, House Committee on Government Operations, asked GAO to determine state progress in cleaning up non-Superfund sites and whether the cleanups met Superfund standards. He also asked GAO to review EPA's proposed policy change to allow states to manage some Superfund site cleanups.

Background

In 1980 the Congress created the Superfund program to clean up the most dangerous hazardous waste sites either with federal money or by requiring action from the parties responsible for the pollution. But the $10.1 billion Superfund is expected to clean up only a small portion of the nation's hazardous waste sites; cleanup of the rest, collectively a serious and costly pollution problem, depends largely on state action.

Cleaning up a hazardous waste site involves (1) deciding on cleanup levels—the extent to which contaminants must be reduced or contained to protect human health and the environment—and (2) selecting cleanup remedies—the ways to achieve the reduction or containment. Cleanup levels for some contaminants at Superfund sites, such as lead in drinking water, are controlled by various federal laws and regulations. The cleanup level for most contaminants, however, is determined site by site following a "risk assessment," which identifies potential harmful effects of contaminants and estimates how much they need to be reduced. EPA procedures call for comparison of alternative remedies to ensure selection of ones that best fulfill provisions of the Superfund law, such as the requirement for permanent, cost-effective cleanup.

Since EPA expects the backlog of Superfund sites to grow, it has proposed a policy change to turn over some Superfund sites to the states for cleanup. Under this policy, called "deferral" because responsibility would be deferred to the states, EPA would not include these sites in the Superfund program if states agree to manage their cleanups, and EPA would not insist that states follow all federal cleanup standards and procedures.

In performing its review GAO sent a questionnaire to all states and visited seven states varying in the age and size of their cleanup programs.

At the seven states visited, GAO selected 17 cleanups for in-depth analysis. These case studies are not necessarily representative of other cleanups in the seven states or nationwide, but they help illustrate the issues states deal with in managing cleanups.

Results in Brief

While most states have accomplished few or no cleanups, some have enacted tough cleanup laws, committed relatively large resources to the cleanup effort, and achieved considerable results. States reported to GAO that of their approximately 28,000 known or suspected hazardous waste sites, they have completed cleanups at about 1,700, or 7 percent, and begun work at another 760. In comparison, EPA had cleaned up 38, or 3 percent, of the 1,174 Superfund sites as of December 31, 1988. Most cleanups were done by a small number of states.

At the 17 non-Superfund sites GAO analyzed, state cleanup plans generally specified cleanup levels that were at least as stringent as those in the federal laws and regulations applied at Superfund sites. However, no federal standards have been set for over half of the contaminants found at these sites. In such cases, if these were Superfund sites, EPA would use a risk assessment to set cleanup levels. For 11 of the 17 sites, the states set cleanup levels without performing such formal risk assessments. Additionally, most states we reviewed selected remedies without the full consideration of alternatives EPA requires. As a result, it is uncertain that these site cleanups will be as protective as required at Superfund sites. Although the Superfund law does not require it, EPA provides technical assistance to states. State officials nationwide said they could benefit from more EPA cleanup standards and technical assistance.

Most states' ability to effectively clean up large, complex hazardous waste sites has not been demonstrated. For this reason and to preserve fair, consistent treatment of responsible parties and the public, GAO believes that EPA should proceed with deferral of Superfund sites only if it can ensure that state cleanups of deferred sites are at least as protective as Superfund requires.

Principal Findings

State Progress

Forty-seven states reported about 28,000 known or suspected non-Superfund sites, but since many have not identified all their sites, the potential universe is much larger. Forty-two states reported inspecting about 7,800 sites and 43 reported cleaning up 1,736, or 7 percent. Progress in long-term cleanup activity is concentrated in a few states. About four-fifths of the 1,736 completed cleanups were done by six states. A third of the reporting states have not completed any cleanups. States generally expect the non-Superfund cleanup effort to be prolonged; for example, 16 thought it would take more than 20 years, and 20 could make no estimate at all.

Three of the states GAO visited, New Jersey, California, and Massachusetts, which are among the most active states, have established major hazardous waste site cleanup programs. All have had, for at least 5 years, laws giving them authority to compel responsible parties to clean up sites, have authorized at least $100 million for cleanup, and employ 100 or more people in their programs.

Most other states have not made major financial commitments to the cleanup of non-Superfund sites. A recent study by a national association found that of 41 states reporting data, only 11 had more than $5 million available at least in part for non-Superfund sites. The progress of most states is heavily dependent on their finding responsible parties willing and able to fund cleanups.

Cleanup Levels

At the 17 non-Superfund sites GAO analyzed, the seven states' cleanup plans almost always met the federal contaminant levels required for Superfund sites or they used stricter standards. For example, the states' plans used federal drinking water standards for cleaning up groundwater. But there were no federal standards for about a third of the contaminants in the groundwater and none for the many soil contaminants at the sites GAO reviewed. At Superfund sites, EPA uses risk assessments to set cleanup levels for these uncovered contaminants. Risk assessments were either not done or were incomplete by EPA standards at 11 of the 17 sites. In some instances all possible contaminants or their exposure routes were not considered.

EPA requires that a number of remedies be studied for a Superfund site in order to select one that is cost-effective, is protective, and to the maximum extent practicable solves the pollution problem permanently. Six of the states GAO visited did not consider the full range of remedies that EPA recommends in order to select the best solution. Only one state, covering 3 of the 17 non-Superfund sites analyzed, considered the full range of remedies.

GAO's nationwide survey, discussions with state officials, and reviews of 17 case studies indicate that states need more information on health effects of contaminants, protective cleanup levels, risk assessments, remedy selection, and cleanup technologies. Although EPA provides states technical assistance in the form of standards, guidance, training, and advice on some sites, more such assistance would be helpful for non-Superfund cleanups.

Deferral of Sites to States

Most states have little cleanup experience at large hazardous waste sites, and their programs and budgets are small. Such states may have limited clout negotiating cleanups with responsible parties. Turning over Superfund sites to states without adequate controls and oversight is likely to result in differing cleanup quality and uneven treatment of responsible parties.

Recommendations

Because the states face a complex cleanup job at thousands of non-Superfund sites, GAO recommends that the EPA Administrator reexamine the nature, form, and extent of EPA's technical assistance to states and EPA regions and implement a strategy for more effective delivery of such assistance. To promote protective, consistent cleanups of Superfund sites, GAO also recommends that any deferral policy EPA adopts include requirements for state eligibility, cleanups at least as stringent as Superfund requires, and monitoring of state cleanups of deferred sites by EPA.

Agency Comments

GAO discussed the report's contents with EPA and state officials and incorporated their comments where appropriate. However, as directed, GAO did not obtain official EPA or state comments on a draft of this report.

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Abbreviations

ARAR	applicable, or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CPF	carcinogenic potency factor
EDF	Environmental Defense Fund
EPA	Environmental Protection Agency
GAO	General Accounting Office
HRS	Hazard Ranking System
IRIS	Integrated Risk Information System
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
NCP	National Contingency Plan
NPL	National Priorities List
OTA	Office of Technology Assessment
PCB	polychlorinated biphenyl
ppm	parts per million
RfD	reference dose
RI/FS	remedial investigation/feasibility study
TCE	trichloroethylene
TSCA	Toxic Substances Control Act
VOC	volatile organic compound
2,4-D	dichlorophenoxyacetic acid

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Chapter 1

Introduction

Hazardous substances have been released at thousands of sites throughout the United States due to accidental spills and intentional disposal at locations unsuitable for their proper containment. As a result, substances have entered the air, soil, groundwater, and surface water, making the environment unhealthful for people and other life. The Congress has passed several environmental laws to prevent additional contamination from hazardous substances and, in 1980, enacted the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) to clean up the nation's worst hazardous waste sites.

CERCLA empowered the Environmental Protection Agency (EPA) to compel parties responsible for the contamination to clean up the sites—many old and abandoned. CERCLA also created a fund, called the Superfund, to pay for cleanups, and authorized EPA to recover its costs from those responsible for the contamination. EPA includes the sites it determines to be potentially the most dangerous on the National Priorities List (NPL), making them eligible for Superfund action. The 1986 Superfund Amendments and Reauthorization Act, which reauthorized CERCLA, set goals for federal cleanups of NPL sites and stated how cleanup standards should be set and remedies selected for the sites.

Although Superfund has a $10.1 billion authorization, only a small percentage of the nation's hazardous waste sites will be placed on the NPL for cleanup through federal action. Cleanup of the non-NPL sites, to the extent it is accomplished, will come from state, local, and private action. Although CERCLA does not require it, many states have established programs to deal with non-NPL sites and, to various degrees, are committing resources to clean them up.

Concerned that many non-NPL sites may pose serious health and environmental risks and are not being adequately addressed, the Chairman, Subcommittee on Environment, Energy, and Natural Resources, House Committee on Government Operations, asked us to assess what progress the states are making in cleaning up these sites and how the standards used for state cleanups compare with EPA guidelines for setting cleanup standards at NPL sites. He also asked us to comment on a recent EPA proposal to allow states to accept responsibility for cleaning up some sites that would otherwise be on the NPL.

Identifying and Cleaning Up Priority Sites for Superfund

EPA is informed of potential hazardous sites by state and local officials, owners and operators of facilities where hazardous substances have been released, the general public, and its own assessment and enforcement efforts. EPA evaluates these sites for the NPL only after they are entered into a data base called the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS). As of March 30, 1989, CERCLIS contained about 31,000 sites, 1,163 of which were on or proposed for the NPL.

Once listed in CERCLIS, a site progresses through a series of increasingly detailed evaluations—performed either by EPA or by a state under a cooperative agreement with EPA—designed to identify and assess uncontained hazardous substances. The first step in the assessment, called a preliminary assessment, uses readily available information to determine whether the situation calls for emergency action, additional investigation, or no further federal action. If the assessment reveals the need for emergency or additional action, the site is inspected to determine if there is any immediate danger to persons living or working nearby. The site inspection may also include monitoring, surveys, and tests. When sufficient information is collected, sites are scored using EPA's Hazard Ranking System (HRS). Scores range from 0 to 100, with 100 being the worst, and are based on contamination of groundwater, surface water, and air. If a site scores above 28.5, EPA can propose listing it on the NPL. As of December 1988, approximately 12,000 of the sites on CERCLIS showed no evidence that they require further response under Superfund.

Whether or not a site qualifies for a Superfund cleanup action, EPA may fund a "removal." Removals are short-term actions to alleviate critical situations. For example, removal activity can include removing drums that contain hazardous waste, fencing areas to limit access, providing alternative water supplies, and temporarily housing people whose health is threatened by hazardous waste. CERCLA (as amended in 1986) limits federal funding for removals to $2 million for each site and requires that actions be completed in 12 months. Longer term federal cleanup actions, called "remedial actions," generally follow if the site is on the NPL.

Superfund Site Management

EPA has a multiphased process for managing remedial Superfund site cleanups. After it puts a site on the NPL and selects it for cleanup, EPA or the potentially responsible party conducts the remedial investigation and feasibility study. Information is collected on the type and extent of contamination at the site, various cleanup alternatives are considered, and their cost effectiveness is assessed. The remedial investigation and feasibility study result in the selection of remedial actions and are documented in a Record of Decision. Recent remedial investigation/feasibility studies have typically taken about 2 years to complete, at an average cost of more than $1 million per site. Remedial actions described in a Record of Decision are then designed and carried out. A congressional staff report has estimated that the average cost of remedial actions ranged from $21 million to $30 million a site.[1]

State Participation

States sometimes take lead responsibility for portions of cleanups at certain NPL sites, including enforcement actions, negotiations with potentially responsible parties, and oversight of remedial actions. EPA's policy requires it to closely monitor state decisions, approve Records of Decision, and ensure that states follow EPA's enforcement policies and procedures. EPA funds state activities when they lead part or all of an NPL site cleanup.

Nature of Non-NPL Sites

While EPA has designed procedures to identify the NPL sites, it is not required to take any long-term remedial action on the non-NPL sites. Non-NPL sites include those that EPA or states have assessed and found to be ineligible for the NPL, unassessed or unscored sites that may or may not eventually be eligible for the NPL, sites that states have not reported to EPA, and undiscovered sites. Nevertheless, non-NPL sites are a significant threat to the environment.

Number of Non-NPL Sites Is Unknown

Accurate data are not available on the number of non-NPL sites, since many still have not been identified. In December 1987, we reported that neither states nor EPA has tried to identify all potential sites.[2] Our own estimate was that between 130,000 and 425,000 sites may eventually have to be evaluated for possible cleanup action. Some states have active site identification programs underway, while other states rely solely on citizen reports of potential sites. Although EPA has studied potential hazards posed by several sources, it has not systematically attempted to identify all potential sites. Instead, it relies on less systematic methods—for example, notification of potential sites by citizens and by officials from other state and federal programs.

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[1] A Report to the Committee on Appropriations, U.S. House of Representatives (Survey and Investigations Staff, Dec. 1988).

[2] Superfund: Extent of Nation's Potential Hazardous Waste Problem Still Unknown (GAO/RCED-88-44, Dec. 1987).

In addition, states do not report all their known sites to EPA, including some that could qualify for the NPL. In our December 1987 report, for example, we pointed out that states did not always report all their known hazardous waste sites to EPA when the states believed that such sites were expected to be ineligible for federal funds or when states thought EPA cleanup was too time-consuming or expensive. This nonreporting still continues, as we shall discuss in chapter 2.

Threats Posed by Non-NPL Sites

According to EPA, while many of the non-NPL sites pose a threat to human health, because of their location and the nature of their contamination, they will affect fewer people than NPL sites. EPA set the Superfund eligibility cutoff score at 28.5 to include at least 400 sites on the initial NPL, an arbitrary number suggested by CERCLA. Since some non-NPL sites' scores are close to the cutoff score, they do not differ significantly from some sites on the NPL. An EPA report included some examples of types of non-NPL sites that pose potential health and environmental dangers.[3] These included the following:

- Some sites are not located near populous areas but could still pose significant environmental damage and health threats through contamination of food chains. Water used for irrigation or stock watering may, over the long term, affect plants and animals that are used for human consumption. Currently, these sites are not addressed by Superfund if human populations are not involved or if there is no immediate hazard.
- At a number of sites, potential exposure to contaminants through direct physical contact has not been factored into the HRS, since the only pathways of contamination considered in the score are groundwater, surface water, and air. These sites may include substances such as lead or dioxin in soil or air that could be inhaled, ingested, or absorbed by humans.
- Some non-NPL sites are located in cities where many people live near the sites. Hazardous waste sites here may involve some groundwater or surface water contamination, but since the population is likely to be served by municipal drinking water supplies rather than the affected water supplies, little exposure could be expected through the routes assessed during scoring.

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[3] Extent of the Hazardous Release Problem and Future Funding Needs: CERCLA Section 301(a)(1)(C) Study. Office of Solid Waste and Emergency Response, U.S. EPA, Dec. 1984, pp. 2-2, 2-3.

On December 23, 1988, EPA proposed revisions to the HRS that could address some of these potentially hazardous situations. The score would consider on-site exposure as a fourth pathway for contamination, if appropriate; EPA would also broaden criteria for evaluating sensitive environments, such as wetlands. While sites that were not eligible for the NPL under the current HRS might qualify under the proposed HRS, EPA has decided not to systematically reevaluate them under the new system, although some may be reevaluated.

Cleanup Standards and Remedies Required at NPL Sites

Before cleaning up a hazardous waste site, EPA must resolve two issues: (1) cleanup levels—the extent to which contaminants must be reduced or contained to protect human health and the environment—and (2) cleanup remedies—the means to achieve the reduction or containment (e.g., whether the contaminants should be burned or buried). EPA bases individual decisions about contaminant cleanup levels on various environmental laws and other guidance and on an assessment of the health risks posed by the particular site. The 1986 Superfund amendments and EPA guidance offer criteria for remedy selection.

Cleanup Standards for NPL Sites

When enacted in 1980, CERCLA did not address cleanup levels or remedies. The absence of cleanup standards sparked controversy and led to confusion in these two areas. While other federal environmental legislation during the 1970's sought to establish national standards for particular media (air, water, etc.), the variety of chemicals found in different media at hazardous waste sites present EPA with complex cleanup problems.

EPA chose not to develop separate cleanup standards for NPL sites, but instead established a policy in 1985 to use contaminant standards from other environmental laws when they are "applicable" or "relevant and appropriate" requirements (ARARs). This policy was described in the National Contingency Plan (NCP), the federal regulation that guides the Superfund program. The NCP incorporated ARARs and required that Superfund remedies comply with ARARs. The Superfund Public Health Evaluation Manual describes EPA's process for setting cleanup levels based on health effects information and on levels derived from risk assessments. Section 121 of the 1986 Superfund amendments basically codified the 1985 EPA policy and surpassed its standards by requiring that cleanup actions comply with promulgated state requirements when the latter are more stringent.

EPA uses a combination of ARARs and risk assessments at Superfund sites. However, ARARs cover only some of the hundreds of contaminants found at Superfund sites; risk assessments often must use other information in setting cleanup levels. The risk assessment examines the health and environmental consequences of exposure to contaminants at sites. In some instances where ARARs are not sufficiently protective, other, more stringent levels may be considered in setting cleanup levels. For example, when multiple carcinogens are present at a site, a risk assessment may indicate that cleanup levels for individual contaminants that are more stringent than ARARs may need to be used. Appendix I of this report discusses how ARARs, health effects information, and risk assessments are used to set cleanup levels at Superfund sites.

Cleanup Remedies for NPL Sites

Section 121 of the 1986 Superfund amendments mandates that remedies be selected in accordance with broad goals it establishes:

> "Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over remedial actions not involving such treatment. The offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available . . . . The President shall select a remedial action that is protective of human health and the environment, that is cost effective, and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable."

In addition, EPA guidance offers nine criteria for selecting remedial actions for treating or containing hazardous waste at a site. Revisions to EPA's regulations proposed on December 21, 1988, weight the nine remedy evaluation criteria and divide them into three groups: (1) two of the nine criteria (called threshold factors) must be satisfied before an alternative can be eligible for selection, (2) five additional criteria (balancing factors) weigh major tradeoffs between alternative hazardous waste management strategies for a site, and (3) two criteria (state and community acceptance) are modifying considerations taken into account in selecting a final remedy. (See fig. 1.1.)

Figure 1.1: Remedy Evaluation Criteria

Threshold Factors

- Overall protection of human health and the environment
- Compliance with ARARs

Primary Balancing Factors

- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume
- Short-term effectiveness
- Implementability
- Cost

Modifying Considerations

- State acceptance
- Community acceptance

Before a remedy is selected, EPA studies the feasibility of alternative courses of action. EPA's feasibility study process calls for developing and screening a variety of these alternatives against the nine remedy selection criteria. According to EPA guidance, alternatives should typically include (as appropriate)

- alternatives that range from treatment that eliminates the need for long-term monitoring and oversight to treatment for major threats;
- alternatives that protect human health and the environment primarily by containing waste and preventing exposure to it; and
- the alternative of taking no action.

The remedy selected must be protective and meet ARARs. It must also take into account the balancing factors and modifying considerations. More information on remedy selection and the various techniques for treating and containing waste is presented in appendix I of this report.

Cleanup Standards and Remedy Selection Criteria for Non-NPL Sites

Neither CERCLA (with its amendments) nor EPA guidance mandates cleanup standards and remedy selection criteria for non-NPL sites. EPA leaves these decisions to states that oversee non-NPL cleanups, except in instances where other federal laws are applicable, such as the Resource Conservation and Recovery Act, which regulates the handling and disposing of hazardous waste, or the Safe Drinking Water Act, which sets limits on contaminants in drinking water.

Although EPA does not oversee cleanup at non-NPL sites, it does provide some indirect help in setting standards and selecting remedies. Some state program officials told us they use federal environmental legislation and EPA guidance as models. In addition, EPA provides training to state personnel and serves as a source for technical advice and information on health effects of contaminants and cleanup technologies.

EPA Proposes Giving States Authority for Some NPL Site Cleanups

Currently some states assess or investigate sites or assume lead responsibility for NPL cleanups. However, EPA retains oversight authority over such cleanups, which must be conducted in accordance with EPA cleanup standards and procedures. A recent EPA proposal would defer adding some sites to the NPL to allow other authorities, including the states, to clean them up.[1] The proposal would increase state discretion regarding cleanup standards and methods for NPL sites. EPA solicited comments on specific aspects of this proposal in the December 21, 1988, Federal Register.

The proposal to defer cleanup of some of the nation's most serious hazardous waste sites to state authorities raises issues about states' readiness and ability to assume this responsibility, the cleanup standards that would apply, and the level of EPA oversight to be provided. Chapter 4 discusses EPA's proposal in light of our findings about state progress and standards used in cleaning up non-NPL sites.

Objectives, Scope, and Methodology

The Chairman, Subcommittee on Environment, Energy, and Natural Resources, House Committee on Government Operations, requested that we study cleanup actions on hazardous waste sites not on the NPL. In particular, he asked us to

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[1] EPA currently defers NPL listing of sites that can be addressed by certain other federal programs. The proposal would allow deferral of NPL sites to three additional authorities: state authorities, other specified federal authorities, and some responsible parties. Since our review focuses on state programs and their cleanups of non-NPL sites, this report does not address potential deferral to other federal authorities or responsible parties.

- assess the progress of cleanup activities at sites not on the NPL and
- determine if cleanup standards being used at non-NPL sites are at least as stringent as those mandated for NPL sites.

We also agreed to provide our observations on EPA's deferral proposal and, as needed, to include recommendations on its implementation.

To determine states' progress in cleaning up sites and understand how they manage sites, we obtained information from both in-depth reviews of seven states' programs and from questionnaires sent to all states. The seven states we visited—California, Indiana, Massachusetts, Montana, New Jersey, Oregon, and Virginia—were selected to include states with both established and new cleanup programs and to provide geographic balance. Responses to the questionnaires were obtained from all 50 states. The questionnaire results provided data on

- states' cleanup progress on sites they have identified,
- cleanup progress on sites scored but not listed on or proposed for the NPL,
- the extent to which potentially responsible parties fund cleanups,
- types of remedies chosen,
- types of assistance the federal government could provide, and
- attitudes on NPL site deferral.

In getting data on state progress, we used two data bases. We requested information from states on about 1,000 individual sites in CERCLIS that had been scored but were not on or proposed for the NPL. We selected these sites because they had been considered significant enough to progress through key phases in EPA's site evaluation and scoring process. Recognizing that these sites would not give us a complete picture of state activity, we also requested information from states on progress made at all non-NPL sites they had identified. The questionnaire's administration is discussed in more detail in appendix II. Appendix III contains a copy of the questionnaire with results.

To address the issue of cleanup standards used at non-NPL sites, we discussed with the seven states their approaches for setting cleanup standards and selecting remedies. While at the states, we also obtained information on a total of 17 non-NPL sites for which remedies had been selected and/or cleanup levels had been set. We discussed each site with its case manager[5] and reviewed site documentation to determine how the standards to be used at the site compared with EPA guidelines for setting standards at NPL sites. EPA officials and a representative from the Environmental Defense Fund (EDF) reviewed each case analysis and summary and provided us informal comments on the standards and remedies used.[6] Our case selection and analysis are discussed further in appendix II.

For our analysis of EPA's proposed deferral policy, we reviewed the proposal and discussed it with officials from EPA, the seven states visited, and three environmental groups: EDF, the Natural Resources Defense Council, and the Sierra Club. Additionally, our questionnaire asked states about the circumstances under which they might clean up deferred sites and their views on the benefits and problems such a policy might create for them and for hazardous waste cleanup in general.

We discussed the issues surrounding non-NPL cleanups with officials in EPA headquarters Office of Solid Waste and Emergency Response (which manages the Superfund program) and Office of Research and Development. We also discussed state activities with officials in EPA regions responsible for the states we visited—Region I in Boston, Region II in New York, Region III in Philadelphia, Region V in Chicago, Region VIII in Denver, Region IX in San Francisco, and Region X in Seattle.

We conducted our review between January 1988 and February 1989 in accordance with generally accepted government auditing standards. We obtained the views of state and EPA officials with responsibility for Superfund and non-NPL activities and incorporated their views into the report where appropriate. In keeping with the Chairman's request, we did not ask EPA or the states for their official review and comment on a draft of this report.

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[5] The case manager is responsible for overseeing long-term cleanup actions at one or more hazardous waste sites. (The EPA or state official who oversees such actions at a Superfund site is called a remedial project manager.)

[6] EDF is a national, nonprofit environmental advocacy group.

States' Progress Toward Cleaning Up Sites Has Been Mixed

The states have made mixed progress cleaning up non-NPL sites. States reported to us that about 28,000 non-NPL sites may need some attention and that all necessary remedial actions have been taken to clean up about 1,700 sites. Most of the cleanups have been accomplished by a small group of states. While the majority of non-NPL sites are not as complex or significant as NPL sites, the problem as a whole is very large because of the high number of sites and the lengthy process required to address a site. In contrast to the 28,000 sites reported by states, EPA has only 1,163 sites on or proposed for the NPL.

Addressing a state's non-NPL sites entails a commitment to oversee responsible-party cleanups and to finance cleanups for which no responsible party will pay. So far, only a small number of states have committed sizable funds to remediate sites for which no one else will pay. These states also have strong enforcement tools available to get those liable for contamination to finance cleanup actions. They also have relatively large staffs that include specialists needed to oversee complex, varied sites. Yet, despite their intensive efforts, they recognize that cleaning up all of the present sites, many of which are not yet identified, will take many years and more resources than are now available in their states.

In other states, cleanup programs are evolving. These states generally recognize that the size of their hazardous waste site problem is much greater than their present programs can handle. Some are now organizing cleanup units and beginning to increase staff to assess sites and oversee cleanups. Many are developing regulations on the basis of authority obtained in recent legislation. However, they have cleaned up fewer sites, and their overall progress will depend on the responsible parties' willingness to pay for cleanups.

Significance of Non-NPL Sites

While not considered to contain the worst contamination, non-NPL sites still are a large problem because of the number of sites; states have so far identified more than 28,000 such sites. Non-NPL sites include some sites that could have scored high enough to be included on the NPL but were withheld from the list because states chose to handle them without federal oversight.

States Report More Than 28,000 Sites Needing Attention

In response to a GAO questionnaire, 47 states identified 28,192 sites that need some attention.[1] (Alaska, Hawaii, and Oregon officials told us they could not estimate the number of their sites.) As shown in appendix III, the number of sites needing attention varied widely from state to state. More than half of the states responding had fewer than 300 sites requiring attention, while seven states had more than 1,000 each. Many states need to further assess sites before they can determine which need to be cleaned up. Some sites included in these figures, then, may be found to need no cleanup. (We discuss our methodology and limitations of the questionnaire results in app. II.)

List of Non-NPL Sites Includes Some That Could Qualify for the NPL

For various reasons, some states have decided not to refer certain sites for NPL listing or to report some sites to EPA for CERCLIS. Therefore, some sites that states thought could qualify for the NPL are being handled without EPA oversight. For example:

- Because Massachusetts law mandates how quickly sites must be cleaned up, the state decides if it can handle the cleanup before referring it to the NPL. A state cleanup official commented that listing the site on the NPL may actually slow down the cleanup, largely due to the length of the waiting period before EPA will address the site.
- To avoid delays, Indiana officials are overseeing cleanup at one site that they believe would qualify for the NPL.
- According to the Montana official responsible for preliminary assessments and site investigations, in the future Montana may stop referring all sites to EPA because EPA takes too long to act on sites.

Based on the responses of 36 states, 5,556 of their 21,674 non-NPL sites, or 26 percent, were not listed in CERCLIS.[2]

Progress Being Made in Cleaning Up Non-NPL Sites

Although states reported that a great many non-NPL sites need attention, actual state progress through the cleanup process shows that only a small number of these sites are being cleaned up. In measuring progress, we analyzed information on (1) all confirmed and suspected sites that states reported, (2) a group of scored sites that were in EPA's CERCLIS data base, and (3) sites in the seven states we visited. We compared cleanup progress on non-NPL sites with progress on NPL sites, recognizing that the latter are generally more complex. We found that most progress was focused in several states and that several others have not yet completed any site cleanups.

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[1] Included here are some currently operating sites regulated by the federal Resource Conservation and Recovery Act and some petroleum sites, even though neither is usually handled under the federal Superfund program.

[2] In our December 1987 report entitled Superfund: Extent of Nation's Potential Hazardous Waste Problem Still Unknown (GAO/RCED-88-44), we recommended that the EPA Administrator issue a formal CERCLIS reporting policy for states and regions to follow.

Status of Non-NPL Cleanups

As shown in figure 2.1, responses to our questionnaire indicate that many sites are proceeding through the assessment phases. According to the 45 states reporting data on preliminary assessments, such assessments have been undertaken or completed at 18,645 sites.[3] The states are encouraged to complete these steps because the federal government reimburses them for their preliminary assessments; EPA has been motivated to complete preliminary assessments because the 1986 Superfund amendments required that all sites on CERCLIS have preliminary assessments completed on them by January 1, 1988. A smaller portion of sites have started the next step of the site assessment process—the site investigation. Forty-two states reported that this phase is underway or completed at 7,776 sites.

States reported that a substantially smaller portion of sites have undergone actions beyond site inspection:

- 1,699 sites in 40 states reporting, or 9 percent of the sites needing attention in those states, have interim responses (short-term actions to alleviate critical situations) underway or completed. These actions may be overseen by either the state or by EPA through its emergency removal program.
- Of the sites needing attention in the 42 responding states, 760 (4 percent) have started but not completed remedial action.
- Of the sites needing attention in 43 responding states, 1,736 (7 percent) have completed all necessary remedial action.[4]

Progress in completing the remedial action phase of cleanups—the phase where long-term cleanup actions are taken—is concentrated in only a few states. Of the 1,736 sites where all remedial actions have been completed, 6 states accounted for 82 percent. Further, 753 completed sites (43 percent) were reported from New Jersey alone.[5] In contrast, of the 43 states that reported on site completion, a third have not yet completed any site cleanups.

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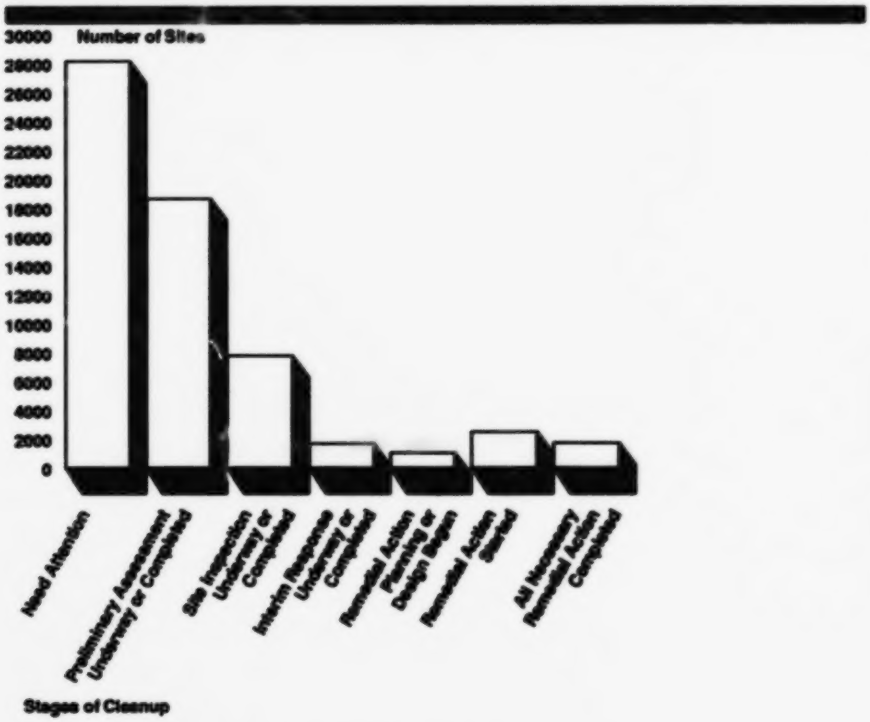
[3] Some states could provide no data for certain questions; therefore, different numbers of responding states are given for each cleanup step. Also, during the preliminary assessments, some sites were determined to need no attention and thus are excluded from the 28,192 sites needing attention.

[4] States sometimes counted removal actions as cleanups completed in instances where a removal eliminated the hazard.

Figure 2.1: Numbers of Non-NPL Sites at Various Stages of Cleanup



Note: Interim responses include both state and EPA activities.
Source: Data states provided in questionnaire responses.

Status of Scored Non-NPL Sites

Scored sites, according to states' questionnaire responses, showed similar cleanup progress. Of the 867 scored non-NPL sites in 32 states, 318 (37 percent) had some action beyond HRS scoring; 47 (5 percent) have had all necessary remedial action completed, with 21 of these occurring in 2 states. (See fig. 2.2.)

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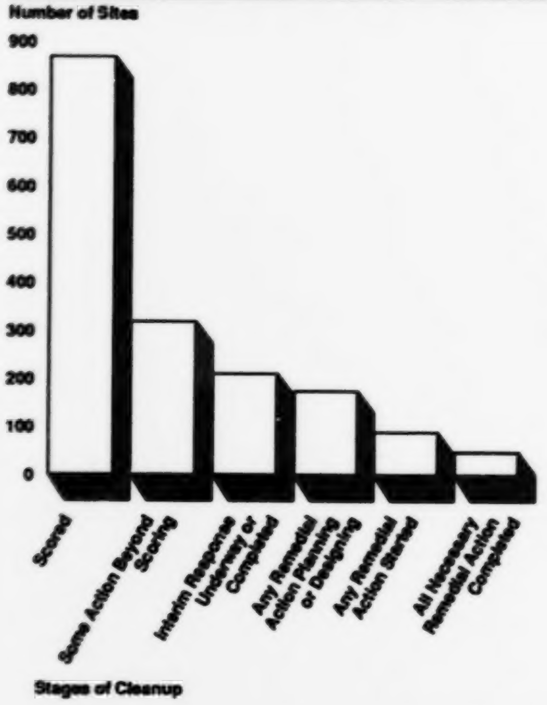
[5] New Jersey's response stated that these figures do not represent cumulative numbers for its total historical cleanup program, which extends back to 1980; if cumulative numbers were included, figures would be larger.

Figure 2.2: Number of Scored Sites at Various Stages of Cleanup



Note: Data were provided by 40 to 47 states, depending on the stage of cleanup

Source: Questionnaire responses from states on 867 specific scored sites

State Projections on When All Sites Will Be Cleaned Up

Although 20 of the 50 states could not estimate how long it will take to clean up all of their sites, the remaining 30 states did provide such an estimate. Six put their estimates at 5 to 10 years; eight put their estimates at between 11 and 20 years; and nine put their estimate at 21 to 50 years. The remaining seven states estimated it would take more than 50 years to complete their identified sites.

Progress at Seven States GAO Visited

Three of the seven states we visited have cleaned up substantially more sites than the other four. However, six of the seven states have a backlog of sites they need to address. In the seventh state, New Jersey, officials reported that action was being taken on all the identified sites. Some states have completed many cleanups, while others are just identifying those sites their new programs must address. The number of sites states have identified has greatly increased in recent years.

Three of the states visited have had state cleanup programs in place for at least 5 years; each has made significant progress in identifying and cleaning up sites. In Massachusetts, for example, the number of confirmed sites increased from 73 in 1983 to over 1,200 in January 1989. As of January 1989, remedial actions had been completed at 273 of these sites. California has undertaken an intense effort to identify sites, assessing about 23,800 and identifying about 5,600 as possibly requiring further action. As of December 1988, 176 sites had been mitigated in California. In its April 1988 status report, New Jersey stated that 102 "major" cleanups (those with estimated costs of at least $100,000) had been completed.

Despite this activity, each of these states has delayed or not addressed cleanup of sites. For example:

- In Massachusetts, a substantial backlog of assessments has accumulated, largely because so many sites have been identified during investigations when properties have been sold. As of April 1989, the state had only enough staff to oversee 70 percent of the 280 priority sites; no staff have been assigned to the remaining sites. Throughout the state, deadlines established in its cleanup law are not being met.
- The California Superfund program's plans identify 328 sites to be addressed in the next 5 fiscal years; 53 additional confirmed sites needing cleanup, and about 5,400 suspected sites needing further investigation. The chief of the Headquarters Site Mitigation Unit in California's Department of Health Services estimated that cleanup of known sites will take 10 to 15 years, not including long-term operation and maintenance.
- New Jersey's Department of Environmental Protection reported in its October 1987 Comprehensive Management Plan that both publicly and privately funded remediations had experienced delays. However, officials recently reported that restructuring the division and increasing the number of staff have eliminated the backlog.

The other four states we visited are just now developing lists of sites that they need to address; in some cases, they did not know how many non-NPL sites they had addressed:

- Virginia officials said that the state has about 425 sites on CERCLIS. Officials thought there were additional sites in the state but could not provide us with a complete and current list of all sites. As of July 1988, the state had remedial investigations or cleanup activities underway at about 10 non-NPL sites. Since no systematic searches are being done, most state program officials we spoke with agreed that the state probably has other undiscovered sites it must identify.

- Montana has about 140 potential sites on CERCLIS, the inventory it uses for planning its Mini-Superfund program. It has evaluated 49 sites for state action, including 8 high-priority sites. The program is addressing four abandoned sites now but has not completed any non-NPL site cleanups. However, other state agencies have conducted cleanups within their authority. The Mini-Superfund program manager believes the state does not have sufficient resources for a site discovery program that would identify additional sites that may warrant remedial action.
- When we reviewed Oregon's cleanup program in August 1988, officials were compiling an inventory of sites with confirmed contamination, a list they expect to contain about 500 sites. The manager of the program's Site Assessment Section estimated that it would take between 10 and 30 years to clean up all the potential sites.
- Indiana's State Cleanup Section was addressing 25 non-NPL sites when we visited in September 1988. Officials characterized most of these as relatively quick and simple actions. In addition to the site cleanups that the section is overseeing, an official estimated that owners of about 60 additional sites are cleaning them up without state oversight. At these sites, the owner has taken action because of real estate transfers, but insufficient numbers of state staff prevent the state from providing oversight for these cleanups. Officials believe that 300 to 400 of the 1,200 sites on CERCLIS will probably require some cleanup activity and are planning to set the priority for each of these sites based on results of their own state scoring.

Responsible Party- Versus State-Funded Progress

States often look to responsible parties to fund hazardous waste site cleanup. The progress of most states is heavily dependent on their finding responsible parties willing and able to fund cleanups. In many states, cleanup activities have been funded almost exclusively by responsible parties. When we asked them about funding from responsible parties for "interim responses" and "remedial action," 19 of the 42 states responding said that more than 80 percent of their sites' interim or emergency responses received at least some funding from responsible parties. Similarly, 19 of the 36 states providing funding information on remedial actions said that between 80 percent and 100 percent of such actions received at least some funding from responsible parties. Table 2.1 shows the states' responses to these two questions.

Table 2.1: Site Actions Funded by Responsible Parties

	Number of states[a]	
Portion of action funded (percent)	Interim response	Remedial action
0 to 20	8	6
21 to 40	5	4
41 to 60	3	3
61 to 80	7	4
81 to 100	19	19

[a] Some states did not respond either because they did not have information on the portion funded by responsible parties or because they did not have any sites that had interim responses or remedial actions

When asked about specific, scored non-NPL sites, state responses also showed that state cleanups depend heavily on funding from viable responsible parties. At the 318 sites that states responding to our questionnaire identified as having some further action beyond scoring, at least 190 site cleanups (60 percent) have been, or are being, funded solely by a responsible party. In addition, 10 sites are being partially funded by a responsible party.

Comparison of Non-NPL and NPL Cleanup Progress

Recognizing that, in general, non-NPL sites as a group are different from NPL sites, we compared states' progress on non-NPL sites to progress on NPL sites since we believe the latter is the best known group of hazardous waste sites. Table 2.2 indicates that while a slightly higher percentage of non-NPL site cleanups have been completed, a greater portion of NPL sites is in some stage of cleanup. Responses show that 70 percent of NPL sites versus 37 percent of the scored non-NPL sites have started some response activity. Similarly, 23 percent of all NPL sites compared to 20 percent of scored non-NPL sites and only 5 percent of all non-NPL sites have started or completed some design activity.

Table 2.2: Comparisons of NPL and Non-NPL Site Activity

Status	NPL sites as of 12/31/88[a]	Total non-NPL sites[b]	Scored non-NPL sites[c]
Sites with response activity[d] (percent)	70	N/A[e]	37
Sites with design activity (percent)	23	5	20
Sites with remedies in progress (percent)	13	4	6
Sites completed (percent)	3	7	5
Total sites	**1,174**	**28,192**	**867**

Note: Some sites are classified in more than one status category and thus column percentages do not total 100. For example, a site with a response activity may have also have design activity and a remedy in progress.

[a] Including sites proposed for and sites on the NPL. We used data from December 31, 1988, because most of our questionnaires were completed by that date.

[b] Some states did not provide the number of sites for each status category. Site information was provided for: design activity by 43 states with a total of 19,705 sites; remedies in progress by 42 states with 18,324 sites; and completed sites by 43 states with 24,692 sites. Each of the percentages is based on the categories' respective total.

[c] Excludes 46 scored sites for which states were unable to report whether any action beyond scoring was taken.

[d] NPL sites with response activity are those for which funds for a removal or remedial action have been obligated from Superfund or where such actions as administrative orders or consent decree issuances have occurred. Scored sites with response activity are the scored non-NPL sites that had some action beyond scoring.

[e] Data not available.

Source: NPL data were obtained from EPA's Office of Solid Waste and Emergency Response. Total non-NPL and scored non-NPL site data were collected in our questionnaire. Scored non-NPL site data were reported on a site-by-site basis.

Three major factors affect progress at NPL and non-NPL sites. First, NPL sites have confirmed contamination problems and are beyond the site assessment stage, whereas many non-NPL sites are still being evaluated. Second, many NPL sites are more complex than non-NPL sites. Therefore, although a higher portion of NPL sites has cleanup action underway, their cleanup would take longer. Third, EPA has a multi-billion-dollar fund to clean up NPL sites if responsible parties are not able to fund cleanups, while many states have small or no such funds. In addition, states reported as cleanups some actions that EPA would call "removals."

Non-NPL sites, in general, depend more on responsible parties for cleanups than do NPL sites. As shown in table 2.3, responsible parties completely financed about 60 percent of scored non-NPL site cleanups while the figure is about 24 percent at NPL sites. Including sites with some responsible party funding increases the figure to 50 percent for NPL sites and 63 percent for scored non-NPL sites—still a significant difference.

Table 2.3: Comparison of Funding Sources for NPL and Non-NPL Sites With Response Activity

	Number of	
Source of funding	**NPL sites[a] (percentage)**	**Scored non-NPL sites (percentage)**
Government-financed (state or federal)	383 (47)	75 (24)
Responsible party-financed	193 (24)	190 (60)
Mixed funding (both government- and responsible party-financed)	218 (27)	10 (3)
Other[b]	27 (3)	39 (12)
Total	**821**	**314[c]**

[a] As of December 31, 1988. Percentages do not total 100 due to rounding.

[b] "Other" sites could include those funded in part or completely by federal agencies or municipalities. The non-NPL figure also includes two sites funded by both the state and another unit.

[c] States indicated a source of funding on 314 of the 318 scored sites with some activity beyond scoring.

Seven States Vary in Their Ability to Address Sites

The state programs we reviewed are growing, as reflected in their available funds and staffing levels. However, states have reported great variations in the cleanup progress they have made. During our seven-state review, we noted several characteristics that influence program effectiveness. Three of the seven states made more progress at getting sites cleaned up than the other four. Not only have these states committed more resources both to administer and finance cleanups, but their authority to enforce cleanup actions has been enhanced by such mechanisms as real estate transfer requirements and triple damage provisions (provisions that require a responsible party to pay back three times the state's cleanup costs). Other states with less funding are unable to clean up many sites where no viable responsible party can be found. Furthermore, with fewer staff, it is more difficult to take necessary enforcement actions and ensure that responsible party cleanups are adequate.

Three State Programs of Seven Visited Have Made Greater Cleanup Progress

New Jersey, Massachusetts, and California have state hazardous waste site cleanup programs that are larger and more active than the other four states we visited. We believe four factors have contributed to this increased progress:

- Specific state authority to clean up hazardous waste sites.
- Strong enforcement tools to increase responsible-party actions, such as authority to impose triple damages and priority liens.
- State Superfunds to address sites without responsible-party funding.

- Sufficient staff with suitable skills to oversee cleanups.

Specific Authority to Clean Up Hazardous Waste Sites

In order to progress in cleaning up hazardous waste sites, states need to have authority both to get responsible parties to clean up sites or to do so themselves when these efforts fail. All seven states we visited had specific authority both to take remedial action and to require others to take action. However, the three states with the most cleanup success have had such legislation in place for at least 5 years:

- New Jersey's 1976 Spill Compensation and Control Act, as amended, gave the state Department of Environmental Protection authority to address hazardous waste discharges when responsible parties do not do so. It also gives the department authority to proceed against responsible parties they identify who do not voluntarily address contaminated sites.
- The Massachusetts Oil and Hazardous Materials Release Prevention Act, enacted in 1983, gave the state Department of Environmental Quality Engineering authority to ensure that appropriate responsible parties clean up hazardous releases or to clean up releases when responsible parties fail to do so.
- California's Carpenter-Presley-Tanner Hazardous Substance Account Act, passed in 1981, authorized the state to take enforcement action against responsible parties and to respond itself when such action gets no results.

Strong Enforcement Tools

A large portion of the funding for non-NPL cleanups comes from responsible parties. To ensure that responsible parties clean up contaminated sites, states need strong and effective legal provisions. New Jersey, Massachusetts, and California all have laws holding responsible parties liable for hazardous waste cleanup costs. These parties are held strictly liable, meaning that states need not prove negligence or failure to exercise due care in order for parties to be responsible for cleanup costs. They are also held jointly and severally liable; therefore, the state can hold any one of them liable for the full costs of cleanup. A Massachusetts official commented that since its environmental agency has authority to hold landowners responsible for cleanup costs, the agency always has an owner to hold accountable. A California official said that the ability to impose strict and joint and several liability has been very helpful in recovering costs.

According to state officials, authority to assess responsible parties for cleanup costs exceeding the state's actual costs discourages parties from delaying actions, letting the state clean up the site, and reimbursing the state afterwards. Some states are authorized to charge a responsible party triple damages for any actions the state takes. New Jersey and Massachusetts have authority to recover up to three times the cleanup costs. California can recover costs plus punitive damages of up to three times the cleanup costs. However, none of the three states had actually recovered these damages as of the dates of our visits. Rather, they find it to be a significant threat that encourages responsible parties to act.

Authority to impose liens for recovering costs of state-funded cleanups is also an important cleanup tool, since it encourages responsible parties to act and could help to replenish funds. In two states—New Jersey and Massachusetts—authority to place priority liens on properties (i.e., liens that take precedence over other liens) for state-funded cleanup activities has been a significant help in getting responsible parties to fund cleanups, since liens on properties can make selling them very difficult. An official in New Jersey said that this authority is beneficial. In Massachusetts, an official commented that this provision's effect is similar to a land transfer law (which would require that property be examined before it changes ownership to determine whether hazardous waste has been incorrectly disposed of there). Mortgagees (lenders) do not want state liens to take precedence over their own liens, so they routinely require that certain properties be environmentally assessed before they grant a mortgage for the properties.

New Jersey has an additional tool that encourages responsible parties to take cleanup actions—a real estate transfer law. This requires a careful review of certain types of properties before ownership is transferred to determine whether hazardous waste or hazardous substances have been improperly disposed of on the property. New Jersey's program, set up under its Environmental Cleanup Responsibility Act, requires industrial establishments to inform the state agency before they sell or transfer property, or close operations. The agency must certify that either (1) no remedial actions are necessary, (2) acceptable cleanup measures have been planned or taken by the landowner, or (3) adequate financial assurance for future cleanup action has been provided. New Jersey officials believe that the transfer requirements are an effective tool to promote hazardous waste cleanups and have helped identify hazardous waste sites that might not otherwise have been found. The cost of state oversight provided is paid by the responsible parties. Because of the program, many cleanups are underway that otherwise might not have been undertaken.

Massachusetts and California do not have laws similar to New Jersey's law requiring that properties be certified before they are sold or transferred or operations are closed. Nonetheless, Massachusetts officials said that they identify many sites because of real estate transfers. Lenders are requiring that sites be evaluated before they will give a mortgage. The state hears of these sites because parties fulfill their legal requirement to report them or they consult the state for advice.

State Superfunds

About two-thirds of the states have their own funds available, similar to the federal Superfund, to enable states to pay for long-term remedial activities. The money enables states to clean up sites for which no responsible party will pay. The three states we visited that had the most cleanup activity have had relatively large funds available for several years:

- Through a tax that New Jersey began collecting in 1978 on the transfer of certain hazardous substances and petroleum products, the state had generated about $143 million as of December 1988. The state also is authorized to sell $300 million in bonds.
- Massachusetts has received funds from a variety of sources. The legislature appropriated $5 million in 1979 for a Capital Outlay Fund and later appropriated $21 million for operating expenses. The state also authorized two bonds for $25 million and $60 million in 1983 and 1986, respectively. Revenues to pay back bond funds and pay additional operating costs come from hazardous waste transporter fees, cost recoveries (including recoveries of cleanup and oversight costs), and certain fines and fees. The transporter fee, which the state environmental department began assessing in June 1986, generated about $7 million in fiscal year 1988.
- California's Superfund program is funded from two sources—a Hazardous Substance Account, which gets revenues from a tax on hazardous waste generated, and a $100 million bond authorization. The bond money has been completely obligated, but total projected costs for investigation and cleanup of sites with no responsible-party funding is $124 million. California's Department of Health Services will therefore be unable to fund cleanup of all identified sites after the middle of fiscal year 1989. Program officials believe a substantial new funding source must be identified to support the program.

Coupled with a state's authority to assess a responsible party for triple damages, such a fund encourages responsible parties to finance cleanups themselves. New Jersey Department of Environmental Protection officials use the threat of a state-funded cleanup to encourage responsible parties to act. To do so, the department sets a rigid negotiation period, after which it will act on a site as publicly funded if the responsible party has not yet begun action.

Cleanup Program Administration

New Jersey, Massachusetts, and California have all committed sizable resources to running cleanup programs. In doing so, each has assigned cleanup oversight to a number of staff with diverse backgrounds. As of July 1988, New Jersey had about 190 staff overseeing responsible-party cleanups, including about 100 persons from the real estate transfer staff. Also, about one quarter of the 260 staff members handling publicly funded cleanups oversee non-NPL sites, with the rest working on NPL sites. For major sites, New Jersey gives primary responsibility for site cleanups to case management teams. Each team includes a case manager, an attorney, a scientist, a geologist, and a public relations person. The Massachusetts program currently has about 140 staff working within the cleanup group and about 110 other staff who provide support, such as legal counsel, toxicological information, and administration. California has about 160 staff members working on site cleanups, with about 80 percent working on non-NPL sites. Skills include law, chemistry, hydrology, toxicology, accounting, hazardous materials, geology, and engineering. An additional 70 staff provide further support, including technical assistance to the cleanup staff.

Another program characteristic that increases cleanup effectiveness is an inventory system. All three states have established systems for keeping an inventory and assigning priority and responsibility for sites:

- To evaluate sites, New Jersey uses a state-developed severity index that considers waste characteristics and the potential for exposure. It keeps this site information within a data base that assists in case tracking and scheduling. It uses this data base to generate the Comprehensive Site Priority List required under state law and used to make and monitor program assignments.
- Massachusetts assesses sites using nine criteria—including, for example, whether there is or could be physical access to a site that allows people to come into direct contact with hazardous materials and whether there are uncontained, migrating and free-floating oil or hazardous materials in groundwater or surface water at the site. Massachusetts law then sets different time frames for priority and nonpriority site cleanup.
- California also has a system for assigning relative work priorities for site evaluations. After a site is assessed, the state scores each site using EPA's HRS scoring system, except when a responsible party will finance all state oversight and support costs (in advance). When a responsible

party voluntarily offers to pay for oversight and assistance, the state determines site priority. If the site is low priority, the responsible party may provide advance funding to hire additional state oversight staff, thus enabling the party to proceed with the cleanup.

Four States Have Done Fewer Cleanups

The cleanup programs we reviewed at the four other states we visited—Indiana, Oregon, Montana, and Virginia—have not existed as long as those in New Jersey, Massachusetts, and California. They also do not have the sizable funding and staff of the other three states. As newer programs, they are just now establishing operating policies and procedures, including priority systems. Generally, we found that problems exceeded current resources, although the states are setting priorities and starting to address their large workload.

Enforcement

All four states have specific authority to take remedial action and to require responsible parties to take remedial action. However, laws setting up their programs were passed fairly recently (Montana's in 1985, Indiana's and Virginia's in 1986, and Oregon's in 1987). Prior to the enactment of specific cleanup authority, any site remediation was done by units whose primary function was in some other area—for example, water quality or solid and hazardous waste regulation.

These states generally have fewer or weaker enforcement tools available to get responsible parties to finance cleanups than the three other states we visited. Montana and Virginia laws do not specifically provide for strict or joint and several liability, and Oregon's provides only for strict liability. None of the four states has the authority to put priority liens on property for cleanup costs that the state finances; they can, however, place common liens on properties. Officials in Indiana and Montana are seeking authority for priority liens. Indiana and Oregon are authorized to recover from responsible parties the costs of a state-funded cleanup plus up to three times the costs in punitive damages; Montana can recover costs plus up to twice the costs in punitive damages; Virginia can recover the actual costs incurred. None of these states has a real estate transfer law, although Indiana officials said they are learning of many sites because of real estate transfers.

Superfunds

As shown below, the four states had substantially smaller cleanup fund balances than the other three; some recognized that cleaning up their hazardous waste sites would require more funding than was available:

- Indiana's trust fund had $5.6 million in unobligated funds as of June 30, 1988. However, no non-NPL, long-term remedial actions had yet been undertaken with public funds.
- Montana's Mini-Superfund program received $100,000 for fiscal years 1988 and 1989. In 1990, program funding will increase to about $240,000. However, Montana's program manager stated that state cleanup funds are not adequate to cover the costs for needed non-NPL cleanups. With funding expected to cover only two sites a year, cleaning up all suspected sites would take at least 25 years.
- Oregon collects about $3.6 million in disposal fees every two years for its Hazardous Substance Remedial Action Fund, but these revenues are expected to decline due to land ban and other disposal disincentives being instituted. A Superfund program manager told us that Oregon's funding for cleanup is inadequate to cover the costs of state cleanups, citing a need for about $10 million per year beginning in 1991.
- Virginia's fund balance of $43,000 (as of February 1988) is comparatively low, although other sources, such as a governor's discretionary fund, are available for funding specific sites.

Program Administration

Indiana, Oregon, Montana, and Virginia have organized their non-NPL cleanup units only within the last few years. All four have started operating with relatively low budgets that allow for only a few staff:

- Indiana's state cleanup section has nine authorized positions, six of which were filled as of September 1988. In addition, a technical support group consisting of chemists, geologists, and engineers assists the section.
- Oregon's recently organized state Superfund program has 21 positions.
- Montana's Mini-Superfund program now has one employee, the program manager, although other Department of Health and Environmental Sciences staff are available as needed.
- Virginia's state cleanup program, which oversees remedial actions at non-NPL sites, will have a staff of about five (equivalent) full-time employees.

Three of the four states are now trying to assess the extent of their non-NPL hazardous waste site cleanup problem and are starting to plan work and assign priority to sites. For example, Indiana is using a modified HRS ranking system to assess all its sites and will then address sites scoring over 10 (out of a possible 100 points) first. Oregon, which is compiling an inventory of sites with confirmed releases, will then rank the sites using a scoring system similar to the HRS. Montana is drafting a state ranking system that will rank projects as high, medium, or low. Virginia, however, has not yet compiled a list of its non-NPL sites.

Cleanup Funds Available in Other States

The disparity we saw in fund balances among the seven states we visited is reflected in funding for other states we did not visit, according to an Association of State and Territorial Solid Waste Management Officials study done in June 1988.[6] The Association's report said that 41 states have established funding mechanisms to handle non-NPL and NPL cleanup activities. Of these, 35 states had money available for long-term remedial action as of January 1, 1988. (See table 2.4. In some cases, the money was also available for funding the state portion of NPL cleanups and emergency removals.)

Table 2.4: Thirty-Three States' Funds Available for Long-Term Remedial Actions as of January 1, 1988

Amount	Number of states[a]
Under $50,000	3
$50,000 - $99,999	2
$100,000 - $499,999	3
$500,000 - $999,999	3
$1,000,000 - $4,999,999	11
$5,000,000 - $9,999,999	5
$10,000,000 - $24,999,999	3
$25,000,000 - $49,999,999	2
$50,000,000	1

[a] Two states had a fund available for long-term remedial action, but they did not provide their balances and therefore are not included in this table.

Source: Association of State and Territorial Solid Waste Management Officials.

The Association reported that most states get their funding from several sources. Nineteen states get most or all of their funds from legislative appropriations, while 20 states supplement their funds with revenue from penalties and fines. Taxes on hazardous waste generated provide part of the funding for nine states. Five states get money from generator fees and transporter fees; 12 depend on bonds to support cleanup activities; and 20 supplement their funds through such sources as transfers from or interest earned on other state trust funds, hazardous waste disposal or treatment taxes, or gifts and donations.

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[6] Survey Results - State Funding Mechanisms for Cleanup of Non-NPL and NPL Hazardous Waste Sites, Association of State and Territorial Solid Waste Management Officials, June 1988.

When we asked states whether they believed that federal funding would be helpful, most reported that they thought it would. Of the 50 states responding to our questionnaire, 37 thought that federal funding for site cleanups would strongly help and 10 thought that it would help somewhat. One thought it would hinder cleanup. Similarly, 42 of the 50 states responding believed that federal funding for state program administration would strongly help and 5 others thought it would help somewhat. Three thought it would hinder.

Peer Matching Program Targeted to Share Expertise

EPA and the Association of State and Territorial Solid Waste Management Officials have recognized the need for states to share information and experiences about state cleanup programs. During 1988, the Association surveyed states to identify what information they needed, what expertise they had in certain areas, and which would be willing to lend their expertise to other states. Questionnaire results pointed out a need for information in several areas: how to recruit and retain cleanup employees, how to contract and procure for cleanups, how to oversee construction, and how to establish computerized information management systems.

With financial assistance from EPA, the Association has matched expertise available with state programs requiring it. As of May 1989, five states had been paired with other states. The Association has also used some of the information gathered so far to target seminars for states.

Conclusions

Cleaning up non-NPL sites is a major challenge confronting the states. The quantity of sites that will be left in states' hands is much greater than those EPA will oversee. Although non-NPL sites are generally not as complex as NPL sites, they can be a significant threat to human health and the environment and need to be addressed.

Collectively, states have not made a great deal of progress in getting their sites cleaned up; individually, there is a wide range of activity and commitment among them. Some state cleanup programs have been operating for several years and have relatively large funds available for cleaning up sites, but others have no money for cleanups when the state can identify no viable responsible party. States with the higher number of cleanups generally had more funds available to pay for cleanups. Those states with strong enforcement tools and sufficient staff to use them have been able to get sites cleaned up by responsible parties. Some states with newer programs are increasing their staff levels, establishing policies and procedures, and gradually accomplishing cleanups.

State Cleanups Reviewed Met Most Federal Standards but Did Not Follow Some Federal Procedures

With few exceptions, cleanup levels set for contaminants at 17 sites in the seven states we visited, were at least as stringent as federal applicable, or relevant and appropriate standards.[1] Some of the states had established regulations or procedures to ensure that federal ARARS were applied to their non-NPL sites. However, ARARS covered fewer than half the contaminants at the 17 sites. The seven states set cleanup levels for the other contaminants based on their own state-established standards or made site-by-site judgments about appropriate levels. Two procedures used by states—the risk assessment process used to establish cleanup levels in the absence of other standards and the remedy selection process—often were not as thorough as the National Contingency Plan and EPA guidance requirements for NPL sites. As a result, while cleanup actions planned at these non-NPL sites should significantly reduce contamination and risks presented by the sites, cleanups may not be as rigorous, or as protective, as EPA requires at NPL sites. These 17 case studies are not necessarily representative of other non-NPL cleanups in these seven states or nationwide.

Most state officials said that increased EPA technical assistance would help them clean up non-NPL sites. Although EPA provides many forms of general assistance to states, state program officials indicated a need for additional funding, health effects data, information on cleanup technologies, training, and assistance in identifying cleanup standards and com pleting or evaluating risk assessments. Current EPA information on health effects, cleanup standards, and treatment technologies falls short of meeting state needs, is not always in a concise format most useful for state personnel, and may not be reaching the appropriate state program officials. Additionally, more cleanup standards and technical assistance could also benefit many NPL case managers.

How States Set Cleanup Levels

The 17 site cleanups varied with regard to the type of contaminants found, media (e.g., soil or water) affected, cleanup costs, and choice of treatment and/or containment remedies. At these sites, states have generally set cleanup levels at least as stringent as available federal standards but have followed less formal and comprehensive approaches to assessing risks than processes set forth by EPA for NPL sites.

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[1] Applicable, or relevant and appropriate requirements are requirements from various environmental laws that may be used in setting cleanup levels for Superfund sites. EPA's use of ARARs in setting cleanup levels is discussed in more detail in app. I of this report.

State Procedures for Setting Cleanup Levels

Officials in five of the seven states we visited compared their standards with federal standards: Some said that their cleanup standards were at least as stringent as federal cleanup standards, and others said they do not differentiate between cleanup standards for NPL and non-NPL sites. Officials in the other two states said they had not had sufficient experience in non-NPL cleanups under their new state cleanup programs to compare their standards with federal standards. Furthermore, a recent GAO report showed that when levels are available,[2] the 26 states that set numeric groundwater standards applied federal drinking water standards[3] (with rare exceptions) to the cleanup of groundwater at hazardous waste sites.

All seven states said they have at least some state standards that exceed or supplement federal standards. They do so by including

- cleanup levels for chemicals for which no federal standards exist;
- cleanup standards more stringent than federal ones;
- standards for media not covered by federal standards, such as soil or groundwater; or
- an antidegradation policy (requiring that state waters whose existing quality is better than established standards be maintained at high quality and not degraded).

The GAO report referred to in the previous paragraph showed that the 20 states reviewed had groundwater standards for 226 contaminants not on EPA's list of drinking water standards.

The seven states in our sample had varied formal or informal processes in place for setting cleanup standards. Two states said that either a designated ARARs coordinator or officials from other state environmental programs review non-NPL cleanup plans to ensure compliance with ARARs. One other state incorporated the NCP, which includes a section on ARARs, into its state law; another requires that its cleanups follow procedures not inconsistent with the NCP. Officials in another state have not completed any cleanups under the state's new program but said that applicable federal requirements would be met. Another state has no formal guidance for identifying ARARs and said that cleanup requirements for a site are dependent on the authority used in requiring cleanup. Officials in the seventh state said it is difficult to compare state standards with EPA standards because site conditions vary so much. Officials in four of the seven states reviewed told us that their processes for setting standards for non-NPL sites are less formal than those EPA describes for NPL sites.

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[2] Groundwater Quality: State Activities to Guard Against Contaminants (GAO/PEMD-88-5, Feb. 1988).

[3] These drinking water standards, required by the Safe Drinking Water Act, establish maximum contaminant levels (MCLs) in drinking water for 30 contaminants. Use of MCLs as ARARs is discussed in more detail in app. I of this report.

Comments by state program officials on their states' standards and processes for setting standards and selecting remedies were generally borne out at the 17 case study sites we analyzed. In the one instance where an applicable federal standard was available, the state planned to meet it. In the numerous instances where applicable federal cleanup standards did not exist, the seven states generally used relevant and appropriate federal standards, state standards, judgment, or health effects data to set cleanup levels. Although most states reviewed used EPA health effects data to assess risks, risk assessments performed for most sites were incomplete compared with what EPA expects at NPL sites. (It is important to reiterate that no federal requirements exist that require that federal procedures be followed at non-NPL sites.) Some risk assessments did not account for all pathways of exposure, some did not factor in health risks posed by all major contaminants, and others stressed existing health risks without considering potential future risks.

Overview of 17 Non-NPL Sites

The 17 sites we reviewed were generally less complex and contaminated than NPL sites. (For illustrative purposes, app. V contains brief descriptions of two of the sites, 1 and 12 on table 3.1.) The 17 sites included both rural and urban locations, as well as a variety of contaminants from diverse sources affecting soil, groundwater, drinking water, and surface water. These case studies are not necessarily representative of other cleanups in the seven states or nationwide, but they help illustrate the issues states deal with in managing non-NPL cleanups.

Table 3.1: Overview of 17 Non-NPL Site Cleanups

			Contaminants[a]	
Site[b]	**Brief description**	**Media[c]**	**Number**	**Types**
1	Stain mfg.	S, GW	20	VOCs, metals, phenols
2	Electrical repair	S	1	PCBs
3	Hat factory	S	1	Mercury
4[d]	Fuel storage	S	1	PCBs
5	Vehicle components mfg.	S, GW, DW	4	TCE, VOCs
6	Molded rubber parts mfg.	S, GW, SW	30	VOCs, metals
7	Circuit board mfg.	S, GW	4	Metals
8	Custom plating	S	7	Metals, cyanide
9	Herbicide mfg.	S	3	2,4-D, herbicides
10	Crop dusting at airport	S	1	2,4-D
11	Mining company	GW	1	Cyanide
12	Mining company	GW	1	Cyanide
13	Electrical equipment mfg.	S	3	PCBs, dioxin, dibenzofuran
14	Electronics firm	GW	1	Hydrofluoric acid
15[d]	Chemical mfg.	S	5	VOCs, metals
16	Beauty and health aids mfg.	S, GW	25	VOCs, metals, pesticides, PCBs
17[d]	Disposable sutures mfg.	S, GW	13	Lead, VOCs, pesticides

[a] VOCs=volatile organic compounds; PCBs=polychlorinated biphenyls; TCE= trichloroethylene; 2,4-D=2,4-dichlorophenoxyacetic acid (a herbicide).

[b] Responsible parties funded cleanups at 15 of the 17 sites; cleanups at sites 4 and 10 were funded by the state and county, respectively.

[c] S=soil; GW=groundwater; DW=drinking water; SW=surface water.

[d] Site cleanup has been divided into different areas, and our review focused on cleanup of only a portion of the site. Additional contaminants present in other areas or media cleaned up under separate cleanup efforts are not reflected in this table.

Treatment technologies were used as remedies at approximately half of the 17 sites, while off-site disposal, on-site containment, or groundwater monitoring were used at the other half. Responsible parties paid for or will fund 15 of the cleanups, while the state or county will fund the other 2. Nine of the planned cleanups had estimated costs of $500,000 to $13 million, three had estimated costs of between $90,000 and $330,000, and costs for the remaining five sites were unknown.

Cleanup Levels for Water Contamination

The seven states generally followed ARARS, where available, for groundwater cleanup, but in some cases their plans did not specify cleanup levels for all contaminants or the points in the groundwater at which the ARARs had to be reached.

Of the 17 sites we looked at, 9 were contaminating nearby groundwater. In one of the nine cases, the groundwater was used as drinking water. The nine sites collectively included 44 different water contaminants; for 28, ARARS [MCLs, maximum contaminant level goals (MCLGS[4]), or federal water quality criteria] existed. For example, MCLs under the Safe Drinking Water Act exist for 14 of the 44 contaminants present in water media at these sites, and no ARARs for water exist for 16 of the contaminants present.

The only federal ARAR standard that was applicable in the 17 cases was an MCL for trichloroethylene (TCE). It was adopted for cleanup of contaminated drinking water at site 5. Cleanup levels were almost always at least as stringent as available MCLs for contaminated groundwater at these 17 sites. In the absence of MCLs, states generally turned to federal guidance (proposed MCLs, actual or proposed MCLs, or federal water quality criteria) unless such guidance set cleanup levels at zero (no measurable contamination remaining). For example, in setting cleanup levels for volatile organic compounds at site 6, the state adopted MCLs where available, but it did not formally adopt zero cleanup levels from other relevant and appropriate federal standards or state antidegradation policies. One state official added that at site 6 they hoped to use zero as a cleanup level for organics but that a zero contamination level might be technically impossible to achieve. According to EPA officials, EPA does not generally adopt zero cleanup levels either.

In addition to ARARs at some of the 17 sites, states used or planned to use one or more of the following in setting cleanup levels:

- State water standards.
- Treatment system effluent discharge limits under the Clean Water Act.
- Risk assessments or health effects data.
- Cleanup techniques (such as pumping and treating groundwater) until the contamination can no longer be detected or as long as contaminants can effectively be removed through the use of this procedure.

At three sites, cleanup levels were not specified for all groundwater contaminants. One state has not yet specified cleanup levels for the four groundwater contaminants at site 5, although the MCL is under consideration for the volatile organic compound found in the highest concentrations (TCE). Another state said that cleanup at site 6 should meet MCLs and treatment system effluent discharge levels under the Clean Water Act, but did not list these levels in its consent decree;[5] it set no specific cleanup level for contaminants that did not fall under these two categories. A third state used technology-based standards at site 1, rather than specific numerical cleanup levels for groundwater contaminants. According to the case manager, this cleanup requires that treatment continue until individual contaminants are below detection limits or the equipment no longer removes significant additional amounts of contamination. Since the detection limit and the equipment's technological capabilities are not specified, we do not know whether such a technology-based standard would result in a cleanup that would meet relevant and appropriate standards.

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[4] MCLGs are nonenforceable standards for public drinking water systems under the Safe Drinking Water Act. Use of MCLGs as ARARs is discussed in greater detail in app. I.

Groundwater cleanup involves setting the standards for contaminants and the point where standards must be met. According to EPA, the cleanup level at Superfund sites is to be met in all groundwater beyond the edge of any remaining waste that will be managed on site. Cleanup plans we reviewed did not always specify where samples would be taken to test cleanup levels, and states selected different points at which to test whether the cleanup level has been achieved. The geographical point at which the cleanup level should apply became an issue in cleaning up drinking water and groundwater at site 5. Although this site did not receive a hazard ranking score, state officials said it would probably have scored high enough to qualify for the NPL. According to the case manager, the specific point at which the cleanup level must be met had not yet been determined. Cleanup efforts underway have resulted in levels of TCE at the drinking water tap and the one contaminated municipal well lower than the MCL. However, whether cleanup of groundwater to MCL levels will be required for the groundwater had not yet been determined as of April 1989. According to one state official, the responsible party believes that requiring that groundwater be cleaned up to MCLs is too stringent, since water from the one contaminated well is blended with uncontaminated water from other wells. Officials from EPA and the Environmental Defense Fund (EDF) who reviewed this case for us agreed, however, that the standard should be met at the on-site source in accordance with EPA's groundwater protection strategy, as would have been required for an NPL site.

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[5] This legal document, approved and issued by a judge, formalizes an agreement reached between the state and the responsible party whereby the responsible party will perform all or part of the site cleanup.

Cleanup Levels for Soil Contamination

Since no federal ARARs exist for soil cleanup, states set cleanup levels for soil contaminants in different ways: Two states used their own soil standards; one state removed all contaminated soil in accordance with state Resource Conservation and Recovery Act requirements; and other states used health effects data to set standards. Fourteen sites in six of the states were contaminated with polychlorinated biphenyls (PCBs), lead, mercury, or some of approximately 41 other soil contaminants.

EPA policy does set soil cleanup standards for PCBs, which were present at four of the sites we reviewed. However, this policy is not an ARAR, according to EPA. In setting cleanup levels for PCBs at these sites, three states turned to PCB cleanup standards in the PCB spill cleanup policy under the Toxic Substances Control Act (TSCA) or to more stringent state standards. This TSCA policy requires cleanup of PCBs to different levels depending upon the location of the spill, the potential for exposure to residual PCBs remaining after cleanup, the concentration of the PCBs initially spilled, and the nature and size of the population potentially at risk of exposure. For soil contaminated with PCB concentrations of 50 parts per million (ppm) or greater, TSCA policy sets the following cleanup standards for decontaminating spills in

- outdoor electrical substations, 25 ppm of PCBs by weight or 50 ppm of PCBs providing that a label or notice is visibly placed in the area;
- other restricted access areas (i.e., fenced industrial facilities or extremely remote rural locations), 25 ppm of PCBs by weight;
- other nonrestricted access areas (i.e., residential areas and commercial areas that are typically accessible to both members of the general public and employees), 10 ppm of PCBs by weight.

Two states established more stringent cleanup levels for PCB-contaminated soil. One set a cleanup level of 5 ppm for site 16, a site that is to be used in the future for commercial purposes. Another state proposed a 1 ppm PCB standard for ravine sediment at site 13 where PCBs may accumulate in fish. Although a third state set a cleanup level of 10 ppm for contaminated soil that lay beneath a PCB transformer at site 4, sampling later indicated that the soil did not contain PCBs, according to the case manager.

Interim remedies chosen for one of the four PCB-contaminated sites we reviewed did not meet TSCA policy cleanup standards. EPA indicated that

PCB cleanup at site 2 would not be regulated under TSCA because PCB releases at the site predate the act's passage. If this site were on the NPL, however, the TSCA policy could be considered as a cleanup standard and could require PCB cleanup of residential areas to 10 ppm and industrial areas with limited access to 25 ppm. While the state set a cleanup level for this site of 50 ppm for the top one foot of soil where a road will be constructed, the responsible party has proposed to remove for off-site disposal soil with 10,000 or more ppm of PCBs on the rest of the site, then to cap the site. The state would not approve this as a final cleanup remedy because of changing land use in the area, but it has agreed to allow interim cleanup to this level to decrease contamination at the site pending additional study to select a permanent remedy.

Because the states used a variety of options for setting cleanup levels, there were different levels from state to state and from site to site within a state. Lead was present in soil at 6 of the 17 sites we reviewed, but EPA has not established a recommended cleanup level for lead in soil. According to a report by environmental and industry groups,[6] cleanup levels set for lead in soil at NPL sites varied from 14 ppm to 100 ppm in the 75 Records of Decision EPA made in fiscal year 1987. Similarly, cleanup levels set by three states we reviewed also varied, as shown in table 3.2.

Table 3.2: Cleanup Levels Set for Lead in Soil

Site	Lead ppm
1	820[a]
8	650
15	400
16	100
17	100
7	46

[a] Maximum existing level of lead from soil analysis. No soil cleanup has been planned.

In one state, lead cleanup levels set at sites we reviewed varied from 46 ppm to 650 ppm; in another state, from 100 ppm to 400 ppm. An official of one state explained that cleanup levels for lead are set on a case-by-case basis, with 100 ppm generally as the cleanup target. He added, however, that in older industrial areas and those with high automobile traffic where ambient levels of lead in soil may be as high as 1,000 ppm to 1,500 ppm, such a stringent cleanup level may not be appropriate. He said that in the area around site 15, elevated lead levels exist because of erosion of lead from naturally occurring deposits and local lead mines. In another state, the case manager at site 8 said that the cleanup level of 650 ppm of lead was based on a risk assessment. This risk assessment assumed that children would not be exposed to the lead since the site will have an asphalt cap.

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[6] Right Train, Wrong Track: Failed Leadership in the Superfund Cleanup Program, Environmental Defense Fund, Hazardous Waste Treatment Council, National Audubon Society, National Wildlife Federation, Natural Resources Defense Council, Sierra Club, and U.S. Public Interest Research Group, June 20, 1988, pp. 50-51.

Soil cleanup levels set for mercury and 2,4-dichlorophenoxyacetic acid (2,4-D), a herbicide, also varied. One state set a soil cleanup level of 1 ppm for mercury at sites 15 and 16, while another state allowed a range of cleanup levels from 1 ppm to 100 ppm at different areas of site 3. At site 9 a state standard was used to set a 1-10 ppm cleanup level for 2,4-D, depending on depth, while another state's cleanup of site 10 achieved a cleanup level of 0.28 ppm for the same contaminant. Although cleanup levels set by these states for mercury and 2,4-D varied, they compare favorably with the October 1987 draft soil cleanup requirements for "clean closure" under the Resource Conservation and Recovery Act.

EPA officials cautioned us that the significance of such differences in cleanup levels depends on a variety of factors, including contaminant toxicity, land use, and additional steps taken to increase protectiveness at the site. At nine sites we reviewed, states had combined cleanup standards with engineering or institutional controls to increase protectiveness. For example, higher concentrations of 2,4-D (10 ppm) will be allowed to remain at site 9 than actually remain following cleanup at site 10 (0.28 ppm); however, site 9 also includes an engineering control (partial capping with asphalt) to deter rainwater infiltration and migration of 2,4-D into groundwater.

Risk Assessments Were Not Performed for Many Non-NPL Sites

States did not require formal risk assessments for the majority of the 17 sites reviewed; in those instances where they were done, they were not always complete. At 11 sites, states set cleanup levels using existing federal or state standards, or judgments, without performing a formal health-based risk assessment. In reviewing summaries of the 17 cleanups, officials we talked with from EPA and the EDF questioned whether all site risks had been accounted for in planning the cleanups. They questioned whether all possible exposure pathways for contaminants had been checked: specifically, possible groundwater contamination at six sites and consumption of fish and recreational contact with contaminants at site 6.

EPA officials pointed out that cleanups at sites 2 and 9 addressed only the contaminant found in greatest concentration, a basis that could be flawed if smaller concentrations of other contaminants present are more toxic. Additionally, EPA officials questioned whether some sites had been adequately tested for other possible contaminants. For example, two of four PCB-contaminated sites were not tested for the presence of dioxin, a common byproduct of PCB combustion that is a probable human carcinogen. According to a state official, dioxin testing at site 16 was unnecessary based on the low PCB level. Even if any of the PCBs present had been subject to the type of combustion that can convert PCBs into dioxin, the concentrations would likely be so low as to remain undetected and would likely not present an environmental risk, according to him.

Specialists in EPA's Exposure Assessment Applications Branch reviewed documentation from four of the cleanups and concluded that the risk assessments at these four sites did not fully conform to EPA guidance that would be used for NPL sites. EPA officials noted the following problems with one or more of the four risk assessments:

- All potential exposure pathways were not discussed.
- Risks for all major contaminants present were not assessed.
- Assumptions behind risk calculations were not included or adequately justified.
- The toxicity of contaminants and their adverse health effects were not sufficiently discussed.
- Outdated toxicity data were used.

The limited number of federal cleanup standards results in state and federal reliance on judgment or risk assessments. Risk assessments can lead to inconsistencies among site cleanups and may affect EPA's credibility and ability to negotiate with responsible parties, according to an internal EPA study on risk assessments.[7] We believe that poorly done risk assessments may similarly affect state credibility and ability to negotiate with responsible parties. According to the Chief of the Exposure Assessment Applications Branch, data quality, assumptions made about exposure, and incomplete analysis of possible exposure pathways can all affect the quality of the risk assessment and the cleanup levels set. He added that such problems are not unique to risk assessments for non-NPL sites; they also occur in risk assessments for NPL sites. Furthermore, according to the aforementioned internal EPA study, "Even an apparently minor inconsistency, such as a variation in an exposure assumption, can affect the final conclusion about risk, and thus potentially the cleanup goal."

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[7] Results of Study, "Evaluation of the Preparation of Risk Assessments for Enforcement Activities," U.S. EPA, Oct. 1, 1978, pp. 4 and 14.

How States Selected Remedies

Most states we reviewed adopted a simpler and more informal remedy selection process than the one called for in EPA guidance for NPL sites. States told us that cost, time, and staff limitations were reasons for these differences. They also cited the predominance of responsible party cleanups as a reason: When private responsible parties clean up a non-NPL site, the state role in remedy selection is normally limited to reviewing and accepting or modifying a cleanup plan proposed by the responsible party. The state does not normally evaluate other alternatives or cost-effectiveness.

The level of formality and documentation states used in their remedy selection processes at the 17 sites varied widely. Of the seven states we visited, those with larger, more established programs generally have promulgated regulations or written guidance. Most officials in smaller, newer programs said they consult informally with colleagues from other disciplines and programs for guidance, but they plan to develop more formal guidance and procedures as their programs become more established.

Most States Considered Few Remedial Alternatives

Six of the seven states we visited considered either a single remedy or a limited number of remedial alternatives for their sites. Case files for the majority of the sites we reviewed described the remedies selected and included little or no information about other possible remedial alternatives. Officials from two states described the role of the hazardous waste department as one of approving or disapproving cleanup proposals submitted by responsible parties or their consultants. For sites 1 and 3, the state documented a somewhat broader range of alternatives but rejected many others. Only one of the seven states followed EPA guidance: At its three sites (7, 8, and 9) it proposed a broad range of remedial alternatives, ranging from no action to extensive excavation and off-site disposal of all contaminated soil, then narrowed the list to those alternatives that are protective and meet ARARS. For site 7, the state also reviewed a range of remedial alternatives for groundwater and eventually selected the "no action" alternative.

Although 11 of the sites listed some remedial alternatives and offered reasons for rejecting alternatives, the reasons offered in the files appeared to us to be perfunctory and unsupported in most instances. For example, incineration was rejected at site 1 as too expensive and subject to local opposition, although no data on the volume of soil to be incinerated and the resulting costs were provided. Off-site incineration was rejected at site 2 because of expense and a backlog at an incinerator owned by the responsible party, although other incinerators might have been available. In other instances, a technology was rejected as unproven or not commercially available. For example, soil washing was rejected for treatment of metals at site 8 because the process was not commercially available at that time, and at site 7 because of a lack of vendor experience with the process and the economic infeasibility of treating such a small volume of soil. Officials from EPA who reviewed summaries of the 17 cases disagreed with these reasons for rejecting soil washing, noting that this technique is currently in use for metal-contaminated NPL sites.

At some sites, other contaminants could have been treated prior to disposal, but were not. At site 6, for example, planned air stripping of groundwater may be effective in removing one class of contaminants present (volatile organic compounds) but will not remove metals present. Additional protection could be achieved by adding a pretreatment process to remove metals, according to EPA officials. For some other sites, treatment of contaminated soils prior to off-site disposal is not planned. For example, metals at site 8 could have been chemically bonded to the soil (fixated or solidified) prior to disposal at a landfill to decrease their mobility and potential for leaching into the groundwater. Fixation was not used for metals at site 8 because of the small volume of contaminated soil involved, according to the case manager. Groundwater treatment could have taken place prior to discharge of contaminated groundwater into the storm sewer at site 14. An EDF official questioned both the potential disruptive impact of contaminants on bacteria at sewage treatment plants and the long-term effect of residual metals and other contaminants that can accumulate in sewer sludges.

Most States Did Not Evaluate Cost-Effectiveness of Remedies

Cost estimates for the remedies selected were available for 12 of the cases we reviewed, but only 4 of these included cost analyses of other possible alternative remedies. Only one of the seven states we looked at included in its proposed remedy a cost-effectiveness analysis similar to EPA's process for NPL sites. In balancing tradeoffs among alternatives to determine which option is the most appropriate remedy, EPA examines the relationship between total costs and overall effectiveness afforded among alternatives to determine which options are cost-effective. A remedy is considered cost-effective if it offers cleanup results proportional to costs such that they represent a reasonable value for the money. Without looking at costs and alternatives for a given site, EPA believes it is difficult to judge whether the most appropriate remedy has been selected. With such information, NPL case managers can better judge whether or not the remedy selected represents a reasonable value for the money or whether other remedies might be more permanent, according to an EPA official. Furthermore, it would allow identification of remedies that are safer, easier, or less expensive to implement. To the extent that cleanup standards and cleanup remedy scenarios can be developed, the need for such cost and alternatives analyses may be diminished, according to EPA officials.

EPA and EDF officials expressed reservations about the small number of remedial alternatives most of the seven states considered. EPA officials said that agency guidance requires that a whole range of cleanup alternatives be considered and that an individual alternative be considered in the context of other feasible options, as well as in light of its cost-effectiveness. They also noted that cost data were not available for many of the case study sites and contrasted this with the EPA process, which compares the cost-effectiveness of feasible alternatives that meet remedy selection criteria. An EDF official concurred that many of the case study cleanups did not adequately consider alternative remedies or reject possible alternative remedies without offering sufficient reasons. We believe, however, that such a simplified remedy selection process may sometimes be more justifiable and useful at non-NPL sites than it would at complex NPL sites because non-NPL sites are generally smaller and less contaminated, thus presenting more straightforward and easily resolvable cleanup problems.

States Selected Both Treatment and Containment Remedies for Non-NPL Sites

Most state cleanup plans called for both treatment and containment remedies in cleaning up hazardous waste at the 17 non-NPL sites we reviewed. Our 50-state questionnaire data do indicate that, when addressing remedies for non-NPL sites, states use treatment technologies favored by the 1986 Superfund amendments. The data also show, however, that some states reported no experience with treating sites, including two of the seven states reviewed.

Remedies selected for 9 of our 17 sites involved treatment of principal threats from groundwater or soil contamination, as shown in table 3.3.

States planned treatment at four of the nine sites that contained contaminated groundwater, generally pumping and treating the groundwater. States also selected treatment remedies for soil contamination at six sites. For example, PCBs were incinerated at site 4 and some soil contaminated with metals was fixated at site 7 prior to off-site disposal. At 12 sites, states selected off-site disposal of soil. At two of these sites, some soil was treated by incineration or fixation prior to disposal.

Table 3.3: Remedies Selected for 17 Non-NPL Sites

	Number of sites[a]
Treatment technologies:[b]	
Incineration/thermal	1
Solidification	2
Stabilization/neutralization	3
Volatilization/aeration	4
Soil washing/flushing	0
Biodegradation	1
Other	0
Containment and disposal:	
On-site containment	6
Temporary storage	5
Off-site disposal	12
Groundwater:	
Pumping and treating	4
Alternate water supply	0
Groundwater monitoring	8

[a] More than one remedy may be associated with a site.

[b] See app. I for descriptions of these technologies.

Many states that responded to our survey reported that they have used various treatment technologies, as well as containment and disposal. Of the 50 states that responded, 30 reported that they have used treatment technologies at least once at a non-NPL site, and 26 reported pumping and treating groundwater one or more times. Of the remaining 20 states, 14 reported they had never used a treatment technology, and 6 did not know whether a treatment technology had been used. More states have used off-site disposal than on-site containment or temporary storage. There did not seem to be any relationship between states with the largest funding balances and use of treatment technologies over containment and disposal. Similarly, there does not appear to be a strong relationship between states with the most sites needing attention and states using more technologies. Table 3.4 totals state responses for various remedies.

Table 3.4: Remedies Used at Non-NPL Sites in 50 States

	Number of states		
	Remedy used	Remedy not used	Do not know
Treatment technologies:[a]			
Incineration/thermal	18	27	5
Solidification	11	32	7
Stabilization/neutralization	15	27	8
Volatilization/aeration	16	28	6
Soil washing/flushing	9	34	7
Biodegradation	17	27	6
Other	9	35	6
Containment and disposal:			
On-site containment	26	18	6
Temporary storage	22	23	5
Off-site disposal	35	10	5
Groundwater:			
Pumping and treating	26	19	5
Alternate water supply	24	22	4

[a] See app. I for descriptions of these technologies.

States and EPA Regions Could Benefit From More EPA Guidance

Although not required by statute or regulation, EPA provides many forms of general assistance to states that can be helpful in their efforts to clean up non-NPL sites. However, on our 50-state survey and in the 7 states visited, many state officials said they could benefit from more EPA-developed cleanup standards and increased technical assistance from EPA. Setting cleanup levels, conducting or reviewing risk assessments, and selecting remedies often require complex judgments based on a knowledge of many scientific disciplines and considerable data collection, especially when cleanup standards have not been established. In making these judgments for non-NPL sites, most states do not have the technical resources and staff that EPA has available to draw on, and many states have limited cleanup experience.

Available EPA Assistance on Setting Cleanup Levels and Selecting Remedies

EPA provides several types of general assistance to states for setting standards at non-NPL sites. Our survey of the states and interviews with EPA officials, however, indicate that EPA needs to reexamine the nature and extent of its assistance to states. Although a thorough review of EPA's training and technical assistance efforts was beyond the scope of this review, we found evidence that some states need greater assistance from EPA to better accomplish non-NPL cleanups.

EPA provides a variety of assistance on setting cleanup levels and selecting remedies. Although it has primarily designed this assistance for use by Superfund contractors and EPA or state personnel overseeing NPL cleanups, much of it is also available to those who perform or oversee non-NPL cleanups as well. These include

- guidance and training in identifying ARARS, performing and evaluating risk assessments, and selecting remedies;
- health effects data on contaminants;
- health risk and EPA regulatory information on about 365 chemicals in EPA's Integrated Risk Information System (IRIS) data base;[a] and
- advice on contaminants, risk assessments, and other factors at specific sites.

Most States Would Like More EPA Assistance

More EPA assistance would be helpful, according to most of the state officials and some EPA program officials we contacted. On our questionnaire we asked states what kinds of assistance EPA should provide to assist them in non-NPL cleanups. The kinds of assistance requested most frequently, both nationwide and for states we visited, most often involved setting cleanup levels and selecting remedies.

At least 43 of the 50 states that responded to our survey said that each of the following types of assistance would help the state's cleanup of non-NPL sites: more assistance with health effects data for conducting risk assessments, reports on new treatment techniques, training for state personnel on treatment technologies, and training on choosing remedies. None of the 50 respondents said federal assistance in the first three areas listed above would hinder state cleanup efforts. In addition, most states said more training for state personnel on identifying ARARS would be helpful. (See table 3.5.)

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[a] IRIS is available at most states, as well as EPA headquarters and regional offices. The primary purpose of IRIS, which has been available since April 1988, is to provide guidance risk values for use in risk assessments. EPA staff and contractors are expected to use the risk information in IRIS for those chemicals in the data base.

Table 3.5: Assistance Requested by States

Type of assistance	Number of states: Would help	Would hinder	Would have no effect
Training for state personnel on treatment technologies	47	0	3
Reports on new treatment techniques/ applications	44	0	6
Training for state personnel on choosing remedies	43	2	5
Health/environmental effects data (for risk assessment)	43	0	7
Training on EPA's process for identifying cleanup standards (ARARs)	37	1	11
National guidelines for setting cleanup standards	35	6	4
Federal standards for soil cleanup	31	7	7
Advice on remedy selection	28	13	8
Federal standards for groundwater cleanup	27	9	9
Federal cleanup standards for all hazardous waste sites	23	14	6

Note: Responses do not total 50 in all instances because some states did not provide responses for each category.

States generally thought that federal standards for soil and groundwater cleanup would help them clean up non-NPL sites. However, somewhat fewer than half wanted federal hazardous waste site cleanup standards. Opposition may be explained in part by state comments that they did not want EPA interference in the cleanup process.

The case study reviews we performed confirmed a need for EPA assistance in such areas as risk assessment, even for states with established programs. Although they have established programs with relatively substantial funding, staff, and technical expertise, two of the seven states we reviewed sought EPA assistance with technical aspects of three of the case studies discussed in this report. One state requested EPA assistance in reviewing the risk assessment for site 15. Another state contacted EPA for information about proposed technologies for handling mercury contamination at site 3 and to determine whether PCB regulations under TSCA applied to site 2. As part of a project with the National Governors' Association, EPA reviews five risk assessments for non-NPL or state-led NPL sites each year and provides feedback (in the form of written comments, meetings, and conferences) on how to improve state risk assessments.

Problems with risk assessment occur at both NPL and non-NPL sites, according to the chief of EPA's Exposure Assessment Applications Branch. He said problems found in risk assessments at our case study sites are typical of many NPL and non-NPL risk assessment problems for cases reviewed by his branch.

Better Technical Assistance and More Standards Needed to Help Hazardous Waste Cleanup

States' need for more guidance on setting cleanup levels and selecting remedies is not unique to non-NPL cleanups; NPL cleanups led by the states and EPA regions also require much help. EPA has recognized the need to improve its technology transfer and training efforts to assist state, local, and EPA regional cleanup efforts. According to an internal report prepared for EPA in 1988,[9] NPL case managers report little or no systematic training to prepare them for their site management responsibilities, which include making decisions about cleanup levels, risks, and remedy selection. Similarly, according to officials at EPA headquarters, EPA Region I, and a national waste management association, state officials may not always be aware of EPA training courses, may be unable to travel out of state to attend them, or may not gain access to limited course slots.

Although EPA offers a variety of technical assistance and support for cleanup decisions, non-NPL case managers are not always aware of such resources. Additionally, NPL case managers do not find the format of available materials useful, according to EPA officials. Furthermore, EPA publications, such as the 1986 Superfund Public Health Evaluation Manual, quickly become outdated and do not contain all current ARARS or more information on the toxic effects of individual contaminants. IRIS, EPA's on-line data base, can potentially overcome both of these problems, but not all state program officials and case managers with whom we spoke were aware of or had access to this resource.

Many EPA regional project managers who oversee NPL cleanups are also unaware of the full extent of technical support and assistance provided by EPA's Office of Research and Development, according to EPA's internal report. The report says that, in many cases, regional case managers have never heard of this Office and are completely unaware of the technical support and services available, or often do not know how to locate the appropriate person within the Office to answer their questions. We believe that state hazardous waste officials are even less likely to be aware of EPA's technical resources because they have less access to EPA resources. Furthermore, the report said that most NPL case managers who were aware of this Office's research reports indicated that most written materials were not helpful because of time pressures they face and of difficulties in locating the materials they need. The director of EPA's Office of Technology Transfer and Regulatory Support acknowledged these time constraints to us and noted that EPA needs to put more emphasis on shorter "how to" guides and computer-assisted instruction to help states.

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[9] Outreach Initiative on Superfund Remedial Investigation/Feasibility Study (RI/FS) prepared by the Research Triangle Institute, Summer 1988.

The availability of additional cleanup standards should assist states in non-NPL hazardous waste cleanup. We found, for example, that states generally follow available numerical standards, such as MCLs. Moreover, the availability of standards helps to reduce state reliance on risk assessments, an area we found to be weak at the state level. One official said his state does not require risk assessments for all sites because they are not needed if an established regulatory framework with cleanup standards exists into which a site appropriately fits. According to him, risk assessments are time consuming and focus the process on decisions about assumptions and risk, rather than on actually cleaning up sites. Furthermore, the 1988 EPA internal report mentioned above noted that NPL case managers need standards, guidelines, and technical support to help in their negotiations with potentially responsible parties and contractors, in monitoring EPA contractors, and in making and defending their decisions (both legally and publicly). The report concludes that "Provision of technical support and assistance, particularly in the form of standards, guidelines and techniques, is crucial for bridging the gap between [case managers'] skills and technical knowledge and their job requirements." Such standards, guidelines, and technical support should also benefit non-NPL case managers.

Conclusions

Although there are no federal cleanup regulations or guidance directly covering non-NPL sites, states generally set cleanup levels at least as stringent as ARARs at the 17 sites we reviewed. Because of the limited number of federal cleanup standards, especially for soil contamination, states frequently turned to their own standards or site-by-site judgments to establish cleanup levels. States did not require risk assessments at most sites, and the risk assessment and remedy selection processes states did follow were often not as thorough as those required by EPA guidance for NPL sites. Although cleanup actions planned or taken at these non-NPL sites should significantly reduce contamination and threats to human health and the environment, it is uncertain that they are as rigorous as required by EPA guidance for NPL sites. Because states used different standards and procedures for cleaning up their hazardous waste sites, chapter 4 includes recommendations to ensure protective cleanups should NPL sites be deferred to states.

Case managers at both non-NPL and NPL sites are confronted with difficult and complex decisions in setting cleanup levels and selecting remedies for cleaning up hazardous waste. Our nationwide survey, discussions with state officials, reviews of 17 case studies, and reports by EPA all indicate that states need more information on health effects, protective cleanup levels, risk assessments, remedy selection, and cleanup technologies. To the extent that EPA establishes cleanup standards for NPL sites, standardizes risk assessment assumptions, and improves health effects data and guidance on remedy selection, it will help case managers at non-NPL sites. Such guidance may simplify non-NPL cleanup decisions by providing protective cleanup levels without extensive site-by-site state analysis, which may be beyond the resources of some states. Such assistance could also help expedite overall cleanup progress. In the meantime, technical assistance is important. Our survey showed that states want such assistance, and there are indications that more assistance would be helpful.

Recommendations to the Administrator, EPA

In view of the difficult task faced by states seeking to clean up thousands of non-NPL sites, we recommend that the EPA Administrator reexamine the nature, form, and extent of EPA's technical assistance to the states to determine how best to assist them in selecting cleanup levels and remedies at non-NPL sites. Given concerns raised within EPA about the need for improved technical assistance on NPL sites, this reexamination should be designed so that NPL case managers in EPA regions and at state-lead NPL sites also benefit. The Administrator should then devise and implement a strategy to increase the delivery of effective assistance to states and EPA regions.

NPL Sites Should Not Be Deferred to States Without Assurance of Effective Cleanups

In its December 1988 proposed revision to the National Contingency Plan, EPA said it was considering whether to allow states to administer the cleanup of hazardous waste sites that would otherwise be included on the NPL.[1] The purpose of this "deferral" to states, as it is called, is to speed up site remediation and preserve federal funds for sites whose cleanup can be achieved only by EPA action. The proposal, which says that deferral "is not intended to ensure equivalence to CERCLA," leaves open the question of how closely remedies selected by states for deferred sites would conform to federal cleanup standards and other requirements. The proposal also neither describes in sufficient detail the capabilities states must possess to qualify for deferred sites nor sets requirements for federal oversight.

Most of the 50 states told us they were willing to administer the cleanup of at least some NPL sites, and our review showed that some states have considerable capability and experience with site cleanups. However, as discussed earlier, we also found that many states have limited site remediation experience and small programs. Since the capability of these states to handle the cleanup of large, complex sites is unproven, regulations controlling deferral, if adopted, should specify the minimum experience and program resources needed to be eligible for deferral. Also, we believe that acceleration in the pace of NPL site remediation should not come at the cost of lowered standards, especially reductions in standards or procedural shortcuts EPA is unwilling to make for the NPL sites it cleans up itself. In our view, no sites serious enough to warrant corrective action under Superfund should be deferred to states except on terms ensuring cleanups at least as protective of human health and the environment as the NCP requires of EPA. In addition, the quality of state cleanups of any deferred sites should be monitored by EPA.

Two Options for Deferral: With and Without Conditions

The deferral proposal indicates that after a site scores above the Hazard Ranking System cutoff or otherwise meets eligibility for NPL listing, EPA would consider deferring it at a state's request. EPA has proposed two options for deferral—differing largely in the latitude given to states to select remedies. Under the first option a state would select its own remedy for the site; it would not be bound by federal remedy selection rules but would have to allow for public comment. The state would have to certify that it

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[1] Since the issuance of the proposed NCP, EPA has decided to consider the deferral policy separately, according to EPA officials.

- has notified the public of its petition for deferral and plans for cleanup under state laws;
- will provide for public participation in the remedy selection process; and
- will hold a public meeting to discuss its decision to petition for deferral, if requested by the public.

Under the second option proposed, EPA would defer individual sites from listing on the NPL where the state provides a more detailed certification of its ability and commitment to clean up the site consistent with certain CERCLA standards. EPA would consider deferring a site if the state demonstrates and certifies in writing that it has

- sufficient regulatory authority to accomplish cleanup of sites itself or to compel action by responsible parties;
- sufficient personnel and funds either for state-implemented corrective action or for enforcement actions, compliance monitoring, and oversight of responsible-party remediation;
- satisfactory schedules with milestones to complete cleanup;
- commitment to provide status reports to EPA and the public;
- provision for public participation in the remedy selection process; and
- commitment to select a remedy that is consistent with CERCLA Section 121 cleanup standards.

EPA's proposal said that this latter option "would require greater EPA oversight than the first option" but did not elaborate on the nature or frequency of such oversight. Nor does it describe what would constitute "sufficient" state regulatory authority or staff and financial resources. It also does not condition deferral on a state's having experience with the cleanup of sites. Moreover, compliance with the NCP cleanup procedures is not required.

Under either option, EPA would retain the right to list the site on the NPL after deferral and use CERCLA cleanup authority if necessary. However, according to an EPA official, EPA would not likely take back a site once a state cleanup was complete, unless there was a great public outcry about the quality of the cleanup. Sites would be deferred only to states requesting deferral of that specific site, and states could still have the lead in cleanup of a listed NPL site. If adopted, deferral would not apply to federal facilities. EPA requested comment in the Federal Register notice whether the deferral policy should be applied to sites already on the NPL.

EPA is proposing to defer NPL listing of sites because it believes that state action will result in more cleanups and the conservation of EPA resources for sites where cleanup cannot be achieved by any other means. The Director of the Hazardous Site Evaluation Division told us that EPA has a backlog of sites on the NPL and expects to add more sites in the future than it can keep pace with. He was confident that some states have the ability to tackle cleanup of deferred sites.

States Generally Support Deferral of Sites Whose Cleanup Would Be Paid for by Responsible Parties

Many of the 50 states that responded to our survey expressed willingness to assume responsibility for cleaning up some deferred NPL sites. Generally, state willingness depends on the availability of funding from responsible parties, although some states said they would accept a deferred site even if it had to be cleaned up with the state's own resources. We also asked states to comment on the benefits or problems a deferral policy might create for them or for hazardous waste cleanup in general.

State Willingness to Accept Deferred Sites

Most states said they would accept deferred NPL sites with a responsible party but would not assume cleanup responsibility for sites without responsible parties. For deferred sites with responsible parties, 40 states said they would be somewhat or very willing to assume cleanup responsibility, 4 were uncertain, and 6 were very unwilling to accept such responsibility. In contrast, for sites where a responsible party cannot be found, 26 states said they would be very unwilling to accept responsibility, 7 said they would be somewhat unwilling, and 4 said they were uncertain. Only 13 said they would be somewhat or very willing to accept responsibility for a deferred NPL site without a responsible party. Twenty-six states said they definitely or probably would have the resources to fund some cleanups for deferred sites with no responsible parties, 5 states were uncertain about funding, and 19 said they probably or definitely would not have the resources for such sites.

Benefits of Deferral Cited by States

We also asked all states to comment on the benefits or problems of deferral. As benefits of a deferral policy, states cited the following: reduces delays in starting cleanups, expedites cleanups, encourages responsible parties to negotiate and clean up sites, is less expensive, and allows states to act on their own policies and requirements. Some states we surveyed criticized the delay between site discovery and listing on the NPL, noting that years elapse before cleanup actually begins. Some states said that deferral would allow states to use their own enforcement authorities to move promptly on problem sites. Other states said that state cleanups proceed more quickly, more cost-effectively, and with very reduced oversight costs. Deferral would help minimize disruption in remedial work started by states that may occur when a site moves from non-NPL to NPL status, according to officials of one state.

Some states said that a deferral policy would give states an important negotiating tool to encourage responsible parties to cooperate and would enhance state program authority. In one state, whose cleanup standards are in some respects more stringent than Superfund standards, officials commented that the deferral policy would also force responsible parties to deal directly with states, instead of shopping around for the best deal among federal and state agencies. They added that the policy would allow states to use the possibility of NPL listing as leverage to obtain the necessary commitments to clean up a site.

Several states said that deferral would enhance state authority to clean up, especially if it included an EPA commitment to accept state decisions on cleanup standards. For example, according to a state official,

> ". . . to date EPA has been unable to clearly establish federal cleanup standards. The combination of lack of federal acceptance of state decisions and the changing federal cleanup standards creates the possibility of having to redo remedial investigations and feasibility studies on sites cleaned up to state standards."

Several states said they would not want their cleanups to be subject to EPA oversight.

Problems With Deferral Cited by States

States cited a number of potential problems with the deferral policy in their narrative responses to our questionnaire and in our discussions with officials in the seven states we visited. The concern most frequently cited by states was lack of funding to handle cleanups without responsible parties. Some states added that they do not have resources to clean up non-NPL sites without responsible parties, let alone NPL sites. One state commented that many states have inadequate funding to handle the backlog of voluntary cleanups.

Other states said they lack sufficient staff and cost-recovery mechanisms for NPL cleanups. One state observed that EPA should consider the state's ability to follow through and the strength of its enforcement program and said that sites with willing responsible parties should not be deferred to states without an active enforcement program. Similarly, officials of another state supported only what they called a "rational" deferral policy, that is, one in which EPA looks for a substantially equivalent program at a state before NPL-type cleanups are deferred to that state. They added that for deferral to be effective, EPA must develop better criteria to assess the capability of different environmental programs.

Safeguards Needed for Deferral

While expediting the cleanup of seriously contaminated sites is a worthwhile goal, it should not be attempted, in our view, by deferring NPL sites to states without assurance of state ability to deal independently with these sites and controls to ensure that remediation at least meets federal standards. First, the ability of many states to control the planning and implementation of remedies for large, complex sites is untested. In addition, deferral without controls would threaten the credibility of the Superfund program by opening possibilities for (1) unequal treatment of responsible parties from state to state and from federal to state programs and (2) inconsistent, possibly inadequate protection from the hazards of these seriously contaminated sites. Finally, bypassing cleanup rules for the nation's worst hazardous waste sites runs counter to the Congress' effort, embodied in the 1986 Superfund amendments, to set minimum standards for these sites and would weaken the bargaining strength of states in their negotiations with responsible parties. In our view, any deferral policy that is implemented should set minimum state eligibility standards, require conformance with the NCP, and give EPA the right to monitor state performance to ensure that cleanups are protective and meet federal standards.

The deferral proposal implies that acceptable cleanup of NPL-type sites is possible without adherence to the NCP. It seems to us that, if there are Superfund cleanup procedures or standards that are not needed for accomplishing protective remedies, or which are needlessly slowing cleanups, EPA should change them for all sites, rather than avoiding them only at certain sites selected by states.

EPA Should Set Eligibility Requirements for Deferral Since State Capability Is Undemonstrated

Our review showed that states are not all equally prepared to assume responsibility for the cleanup of deferred NPL sites. As shown in chapters 2 and 3, states vary in the amount of progress they have made in cleaning up non-NPL sites, the cleanup standards set for sites, and the resources devoted to cleanup programs. A few states have developed large, well-funded cleanup programs and accomplished many site remediations. However, most states have had limited experience in cleaning up non-NPL sites, and some may not be prepared to assume the more complex and difficult challenges of an NPL cleanup. Of the 47 states that reported numbers of suspected or confirmed sites to us, 14 have not yet completed any site cleanups, and 11 others have cleaned up eight or fewer sites. Of the 1,736 sites where all remedial actions have been completed, 82 percent were performed by six states.

While many states have had experience "leading" NPL cleanups under cooperative agreements, their performance is supposed to be monitored and controlled by EPA throughout, and EPA must approve their cleanup remedies. According to EPA officials, experience with "state leads" does not necessarily indicate ability to independently undertake cleanup of NPL sites. Moreover, as of March 3, 1989, 18 states had not led the cleanup of any NPL sites, and only 15 had been responsible for more than five Records of Decision or their implementation.

In a March 29, 1988, report the EPA Inspector General criticized state performance under cooperative agreements, saying that states ". . . had not effectively performed their cooperative agreement goals and objectives, or were substantially behind schedule in their completion."[2] The Inspector General's report noted that:

> "Several factors contributed to these conditions. Some cooperative agreements were prematurely awarded because the recipients did not meet the financial, technical, and experience requirements for an award. In addition, some EPA Regions and recipients developed a complacent or passive attitude to the completion of the cooperative agreement objectives. We [EPA's Inspector General] further noted that some Regional offices and recipients failed to establish effective lines of communication or working relationships with each other. Finally, the Regions had not always maintained accurate management information systems to reflect the status of the existing and proposed NPL sites within their geographical boundaries."

Improvement Needed in Proposal's Criteria for Determining State Readiness for Deferral

The proposed deferral options require little evidence of a state's readiness to assume responsibility for the cleanup of deferred NPL sites. The more restrictive of the deferral options requires that states provide somewhat more information about their program authorities and resources, but neither option includes criteria for determining which states have sufficient resources and experience for handling sites that would otherwise be listed on the NPL. Cleanups could be delayed or not sufficiently protective if unprepared states assume responsibility for deferred sites.

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[2] "Capping" Report on EPA, Office of the Inspector General Audits of Superfund Cooperative Agreements for Fiscal Years 1985 Through 1987 (Audit Report No. E5eE8-09-0018-80838, Mar. 29, 1988).

For the deferral program to succeed, EPA needs better criteria for deciding which states are prepared to handle cleanup of deferred sites that would qualify for the NPL. Criteria could include

- a proven record of cleanup experience with complex, extensively contaminated sites;
- a record of successfully negotiating protective cleanups with responsible parties;
- specifications for the staff, including technical specialists, and resources to be committed to cleaning up deferred sites; and
- adequate arrangements for state oversight of responsible party cleanup plans and actions.

Cleanups of Deferred Sites Should Be Consistent With the NCP

The deferral proposal would grant discretion to states to approve remedies for sites that would otherwise be on the NPL. Even under the more restrictive of the deferral options, deviations from NCP standards would apparently be permitted. EPA's proposal states that:

> "A deferral would not be a delegation of any CERCLA authority, and it is not intended to ensure equivalence to CERCLA. By deferring to a State authority, EPA is not approving the remediation to be undertaken by that State authority. In considering this deferral policy, EPA recognizes that corrective actions under State authorities may not follow the procedures and requirements of the NCP, and in some cases, this may result in differences, e.g., some States may have more stringent corrective action standards than EPA while other States may have less stringent corrective action standards. Requiring State authorities to conform strictly to NCP requirements might result in fewer States choosing to undertake a site remediation that could be deferred. EPA requests comment on the level of remediation that should be required for sites deferred to States."

As discussed in chapter 1 and appendix I, CERCLA, as amended, establishes general guidance for setting cleanup standards and selecting remedies for Superfund sites. Cleanup rules and procedures EPA follows at Superfund sites are contained in the NCP and in guides and handbooks EPA has developed over the course of the Superfund program. Even considering these, however, EPA officials said that Superfund project managers exercise considerable discretion over the selection and design of cleanup solutions. Since few standards are applied automatically, decisions are made following site-specific risk assessments and evaluations of (among other things) the protectiveness and cost-effectiveness of remedies. EPA itself has been criticized by the Office of Technology Assessment (OTA) for making inconsistent cleanup decisions from site to site.[3] We believe that sites that would qualify for the NPL should be cleaned up consistently and should at a minimum meet federal cleanup standards.

Inconsistency is likely to worsen if states are given unsupervised control over NPL-type sites. At non-NPL sites we reviewed, most states were not required to and did not fully follow the NCP or EPA's guidance for performing risk assessments and selecting remedies. Some state officials said that they followed a less formal cleanup process, and the cases we selected for analysis reflected this. The result of inconsistent cleanup decisions made by states operating independent of EPA control might be unequal treatment of responsible parties, unjustified differences in the protection of public health, and the erosion of public confidence in the fairness of the Superfund program. In addition to increasing the variability of cleanup, if states do not follow EPA guidance on documenting the rationales for decisions, it will be difficult for EPA or others to know whether cleanups are protective or use the best cost-effective remedy.

Deferral Without Standards Could Leave States in a Weaker Bargaining Position

Deferral to states without requirements for cleanup standards and remedies may also leave them in a weaker position in their negotiations with responsible parties over required cleanup actions. States may be at a disadvantage compared with EPA in dealing with responsible parties that are major employment and tax sources for the state.

A state official told us she was concerned about the potential for responsible parties to pressure states to request deferral of sites to keep them off the NPL. An EPA headquarters official mentioned to us as one potential risk of deferral that states, in bending to economic pressure, may submit to lesser cleanup standards while negotiating agreements with responsible parties. Furthermore, responsible parties could use the threat of moving away, cutting jobs, or declaring bankruptcy to negotiate lower cleanup standards, particularly in states without strong programs.

A state official in written comments submitted to EPA expressed the concern that deferral would result in inconsistent cleanups, out of line with the requirements of the 1986 Superfund amendments. The official said, ". . . SARA's [the 1986 Superfund amendments'] intent to provide a cost-effective, standardized, and permanent cleanup could be undermined by allowing states with varied state environmental laws and less stringent corrective action standards to clean up hazardous waste sites."

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[3] Are We Cleaning Up? 10 Superfund Case Studies—Special Report (OTA-ITE-362), OTA (June 1988).

The 1986 Superfund Amendments Established Minimum Cleanup Standards

As the Superfund program has evolved, standards for cleanup and criteria for selection of remedies have gradually developed. When CERCLA was passed in 1980, it did not contain cleanup standards. In a report prepared for Superfund's reauthorization, we said that "The absence of cleanup standards is one of the most important issues confronting the Superfund program; it has a direct bearing on the program's cost and the extent to which cleanup actions will protect public health and welfare and the environment."[4] According to the Bureau of National Affairs, Inc., OTA reported at the time that methods for determining the extent of cleanups at Superfund sites appeared to be ad hoc and inconsistent and that no national goal of cleanup had been defined. Without such goals the selection of cleanup technology was, OTA said, difficult and contentious.[5] The Congress responded in the 1986 Superfund amendments by setting minimum cleanup standards and providing guidance on remedy selection. EPA has drafted regulations to implement these 1986 provisions and developed other guidance for agency decision makers to define acceptable cleanup standards and procedures.

The deferral proposal runs counter to this trend toward more standardized and predictable cleanups. The first option especially would put decision making on one class of NPL-type sites—deferred sites—back in the pre-1986 era, which was found to be unsatisfactory.

EPA Should Monitor State Cleanups of Deferred Sites

Even if deferral were conditioned on states' complying with the NCP, many of the decisions states will need to make on the cleanups of deferred sites would be based on their own judgment. As discussed in appendix I, at present, simple clear-cut formulas do not exist for designing remedies. Instead, many aspects of remedial design must be tailored to the contaminants, media, and site in question. Therefore, EPA should actively review state cleanups, at least until a state has established a history of effectively remediating deferred sites. Less intensive oversight may be possible at that point. As indicated earlier, the deferral proposal does not describe what, if any, monitoring EPA would do of deferred sites.

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[4] Cleaning Up Hazardous Waste: An Overview of Superfund Reauthorization Issues (GAO/RCED-85-69, Mar. 29, 1985).

[5] Superfund Strategy (OTA-ITE-252), Office of Technology Assessment (Apr. 1985).

In our recent report on EPA management,[6] we recommended that EPA consider periodically "recertifying" state authority to operate delegated environmental programs. These programs, which include the Resource Conservation and Recovery Act, are operated by states under EPA guidance. Recertification would involve examination at appropriate intervals of the results of the states' management of delegated programs. Continued delegation would depend on a state's successfully standing up to this scrutiny. This approach could be applied to Superfund deferral once a state has accomplished the cleanup of sites with closer oversight.

Conclusions

EPA expects that it will be unable to keep up with future increases in the number of Superfund sites and predicts that backlogs of sites awaiting cleanup will grow. Under the circumstances, contributions by states to the cleanup effort would be welcome. EPA has proposed to change its policy to permit states to manage the cleanup of sites that would otherwise be listed for Superfund action. EPA would not insist that its regular cleanup procedures be followed or even, under one scenario, the general cleanup standards in CERCLA. In addition, EPA's proposal does not define sufficiently the state program capabilities needed to qualify for deferral or indicate the extent of EPA oversight.

Our review showed that some states have large hazardous waste site programs and considerable experience with site cleanup. Some form of deferral may be workable. However, for several reasons we believe that any deferral policy should have stronger controls over cleanup than the deferral proposal establishes. First, most of the 50 states have little experience with the cleanup of hazardous waste sites. Several of the states we visited had new programs, small staffs, and not enough funds to clean up many sites without support from responsible parties. The ability of most states to clean up hazardous waste sites independently has not been demonstrated. A recent EPA Inspector General report criticized states for inadequately performing their Superfund site "lead" responsibilities. Second, the inconsistent cleanup levels likely to result from uncontrolled deferral could damage Superfund's credibility through unjustified differences, from state to state and between federal and state programs, in the treatment of responsible parties and the protection afforded the public. Finally, deferral without standards would weaken the negotiating strength of states dealing with responsible parties and runs counter to the trend in Superfund, reinforced by the Congress in the 1986 Superfund amendments, toward more specific cleanup standards.

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[6] Environmental Protection Agency: Protecting Human Health and the Environment Through Improved Management (GAO/RCED-88-101, Aug. 16, 1988).

Recommendations to the Administrator, EPA

To ensure consistently protective cleanups for sites so seriously contaminated that they could be listed on the NPL, we recommend that the Administrator require, in any deferral policy EPA adopts, that

- state cleanup of deferred NPL sites be consistent with the NCP;
- states' eligibility for deferrals be conditioned on their meeting specified standards, including standards for experience and resources; and
- EPA have the right to monitor state cleanup performance on deferred NPL sites.

We further recommend that, if a deferral policy is implemented, the Administrator periodically monitor state cleanups for compliance with the deferral requirements.

Selecting Cleanup Levels and Remedies at Superfund Sites

The following describes briefly EPA's procedures for selecting cleanup levels and remedies at Superfund sites.

Selecting Cleanup Levels

EPA uses applicable or relevant and appropriate requirements from various environmental laws and other information on the health and environmental effects of contaminants to set cleanup levels. ARARs and other health effects data are applied after an assessment of the risks posed by site contaminants.

Using ARARs to Set Cleanup Levels

In 1985 EPA listed over 40 federal laws or requirements that could be ARARs for a site. To be applicable to a specific site, a requirement or cleanup standard must be legally enforceable under a promulgated federal or state law and fully address the circumstances at that site. Relevant and appropriate requirements are not legally applicable to a specific site, but they address problems or situations sufficiently similar to those at the site to the extent that their use is well suited to the particular site.

EPA interim guidance recognizes as ARARs "chemical-specific requirements" in various laws that set quantitative concentration limits or ranges in various environmental media for specific contaminants.[1] The following standards drawn from laws relating to drinking and surface water are considered to be potential ARARs for contaminated water at NPL sites.

- Maximum Contaminant Levels. These are drinking water standards set under the Safe Drinking Water Act that establish maximum allowable concentrations in drinking water for 30 contaminants. For example, this act sets the MCL for lead in drinking water at 50,000 parts per billion. These standards are based on health considerations as well as the technical and economic feasibility of achieving the standards. The Safe Drinking Water Act amendments of 1986 require EPA to promulgate national primary drinking water standards for 83 contaminants within 3 years and thereafter standards for an additional 25 contaminants every 3 years.

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[1] Other laws, such as the Resource Conservation and Recovery Act, which regulates the handling and disposal of hazardous waste, include requirements that may be ARARs, depending on the cleanup actions taken at a site and the site's location. EPA calls these ARARs "action-specific" or "location-specific" requirements. Our discussion of cleanup levels in chapter 3 focuses on state use of chemical-specific ARARs, since it is most feasible to obtain information on state compliance with them.

- Maximum Contaminant Level Goals. Although promulgated as part of the Safe Drinking Water Act, MCLGs are nonenforceable, purely health-based standards for public drinking water systems that, unlike MCLs, do not consider cost or technical feasibility. In practice, MCLGs have the same value as MCLs for noncarcinogens; for carcinogens, MCLGs are set at zero, while MCLs are set at a threshold level where there are no adverse health effects.[2] As of June 1, 1989, EPA had promulgated MCLGs for nine contaminants.
- Federal Water Quality Criteria. These are guidelines developed under the Clean Water Act for states to use in developing their own water quality standards for surface water. Health estimates are derived to protect people and aquatic life when they are exposed to chemicals in the surface water. These estimates do not reflect technological or economic considerations.

Whether the above standards are found to be ARARs at a particular site depends on judgment about site-specific factors. EPA's Superfund policy states that MCLs are ARARs for groundwater where the groundwater is or may be used as drinking water.

In contrast to the ARARs available for contaminated water, EPA does not have standards that set cleanup levels for soil. However, the PCB spill cleanup policy under the Toxic Substances Control Act sets cleanup levels for soil contaminated with polychlorinated biphenyls. Under this policy, the allowable maximum concentration of PCBs depends on whether access to the land is restricted and the purposes for which the land will be used. Although EPA does not view the spill cleanup policy as an ARAR for PCBs, the TSCA policy could be considered along with other health advisories and guidance in setting cleanup standards. Soil contamination thus remains an area for which virtually no ARARs exist, although most contaminants at hazardous waste sites are found in soil, according to an EPA Superfund official.

The 1986 Superfund amendments allow ARARs under federal and state environmental laws to be waived under certain specified circumstances. They specify six circumstances under which an ARAR requirement can be waived, including technical impracticability and the need to balance funding for a given site against funding needed to respond to threats at other Superfund sites. When an ARAR cannot be met, justification for the waiver must be documented.

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[2] Some Members of Congress maintain that the 1986 Superfund amendments intended MCLGs to be the primary ARAR, rather than MCLs. EPA contends that MCLs are protective of human health while taking technology and costs into consideration.

Using Other Health Effects Information to Set Cleanup Levels

Other criteria, advisories, or guidance can be considered in setting cleanup levels where ARARs are not available. Such additional guidance is not considered to be an ARAR, but may be taken into consideration in setting cleanup levels because there are so few ARARs. The additional guidance includes proposed requirements as follows:

- Proposed MCLs. In general, proposed requirements, including proposed MCLs and MCLGs, are not ARARs but should be considered along with other advisories and guidance on health effects. These are the same types of drinking water standards as MCLs, but they have not yet been promulgated. As of June 1, 1989, EPA had proposed MCLs for 46 contaminants.
- Proposed MCLGs. These are the same types of drinking water standards as MCLGs, but they have not yet been promulgated. As of June 1, 1989, EPA had proposed MCLGs for 41 contaminants.

Two toxicological parameters are regularly used to provide information on the toxicity of contaminants in the absence of chemical-specific ARARS:

- Reference Doses (RfDs). RfDs are verified or not-yet-verified estimates of the level of exposure to a chemical at which no adverse noncarcinogenic health effects are expected to occur.
- Carcinogenic Potency Factors (CPFs). CPFs are estimates of the strength (hence potency) of carcinogenic substances. CPFs are combined with exposure estimates to calculate upper-bound estimates of cancer risks in an exposed population.

Using Risk Assessment to Set Cleanup Levels

A Superfund risk assessment estimates the extent to which a population has been or may be exposed to a certain chemical and the hazard posed by the chemical. This permits estimation of the present or potential health risk to the population involved and the establishment of a cleanup level to minimize risk. Unless a risk assessment shows that they are unprotective in the site-specific circumstances, ARARs are generally used to set cleanup levels for the contaminants they cover. Because EPA has not adopted such standard exposure scenarios for all chemicals and exposure routes leading to an ARAR, risks must be assessed site by site.

In the absence of ARARs, EPA's risk assessments for NPL sites use various sources of information on the health effects of contaminants and make estimates about exposure to those contaminants at a particular site. Exposure assessments, which are site specific, describe the potential pathways through which contaminants might migrate and expose people at or near a site. Each pathway includes a source of chemical release, a media and pathways through which the contaminant would migrate, a point where people could be exposed, and a likely exposure route. The health effects data help to define what levels of a contaminant are toxic or correspond to a given level of risk. Combining health effects data and exposure estimates is useful in setting a cleanup level for a contaminant.

The Superfund risk assessment process relies heavily on two sources of health effects data on the toxicity of contaminants: the RfDs for noncarcinogens and CPFs for carcinogens. EPA uses RfDs to indicate for noncarcinogens the threshold of the contaminant's daily intake below which there are not expected to be any harmful effects. CPFs, the toxicity values used to develop cancer risk estimates, are expressed as the upper-bound slope factor in units inverse to exposure. Multiplying CPFs by exposure estimates will yield an estimate of the upper-bound lifetime cancer risk associated with that exposure. These risks are then expressed as probabilities. For example, the 10^{-6} risk range represents a level where the probability is that less than one person in a million would develop cancer from exposure to site-related carcinogens under the site-specific conditions. The concentration level that represents a 10^{-6} cancer risk is then used as a target cleanup level that is called a "point of departure" because this concentration level can be adjusted within a range of acceptable risk, provided there are sufficient site-specific justifications. Remedies considered should reduce contaminant concentrations to levels associated with a carcinogenic risk range of 10^{-4} to 10^{-7} (1 in 10 thousand to 1 in 10 million) where possible, according to Superfund risk assessment guidelines. The total cancer risk is calculated for all carcinogens in a single medium or exposure pathway (e.g., groundwater). If carcinogens are present in multiple pathways, aggregate site cancer risk should also be calculated.

Although EPA has published agencywide and Superfund-specific guidance on performing risk assessments, the assessments involve judgments and uncertainties that potentially affect the cleanup levels and remedies selected for a site, according to EPA officials. Assumptions and professional judgment are required in many parts of the process, especially where information is limited. For example, information on site history and chemical monitoring data about the site may be lacking, the risk assessment may be based on a limited number of selected contaminants at the site, or EPA may not have toxicity and health effects data for all contaminants potentially present. Furthermore, most toxicity information is often derived from animal studies, and scientists disagree about how to interpret these data and to extrapolate from them to estimate potential effects on humans. Toxicity data are also based on single contaminants and do not normally account for the possible synergistic effects of exposure to multiple contaminants at a site. Finally, the risk assessment process depends on assumptions made about the movement of contaminants, exposure to those contaminants, and other factors. Such assumptions, for example about how much soil a child ingests, may affect the cleanup levels set for a site, according to an EPA official.

Selecting Remedies

Selection of remedial actions for Superfund NPL sites involves choosing between various techniques for treating or containing hazardous materials.

Screening and Selecting NPL Remedies

EPA's process calls for an initial screening of possible alternatives followed by a detailed analysis of selected alternatives against the agency's remedy selection criteria. The initial screening evaluates possible remedial alternatives in terms of their effectiveness, implementability, and costs. Additionally, studies may be required to determine the effectiveness of proposed treatments on the specific contaminants and media present. During the detailed analysis each alternative should be assessed against EPA's nine remedy selection criteria. At a minimum, alternatives retained for detailed analysis must meet the first two of these criteria: protection of human health and the environment and compliance with ARAR standards. EPA views a remedy as protective if it adequately eliminates, reduces, or controls all current and potential risks posed through each pathway by the site. Controlling exposure to hazardous waste can also help to protect human health and the environment, for example by using certain engineering controls, such as a cap that covers the waste and deters infiltration by water that may cause contaminants to wash or migrate off site. Institutional controls, such as deed restrictions, may also be used to control exposure to waste remaining on site. Compliance with ARARs is a statutory requirement that must be met unless a waiver is invoked.

The next five remedy selection criteria are balancing factors used to weigh major tradeoffs among remedial alternatives: long-term effectiveness and permanence; short-term effectiveness; reduction of toxicity, mobility, or volume; implementability; and cost. Long-term effectiveness and permanence address risk remaining at the site after remedial alternatives have been completed and focus on the effectiveness of engineering and institutional controls that will be used to manage remaining risk. Short-term effectiveness focuses on potential effects on human health and the environment during the construction and implementation of the remedial alternatives. Reduction of toxicity, mobility, or volume addresses the statutory preference for remedies that treat wastes by considering the actual reduction in toxicity, mobility, or volume of contaminants achieved by the remedial actions taken. Implementability addresses the technical and administrative feasibility of implementing an alternative and the availability of services and materials required for its implementation. Finally, cost includes all construction, operation, and maintenance costs incurred over the life of the project. The final two remedy selection criteria, state and community acceptance, are an ongoing concern throughout the remedial process, but are generally formally addressed in the Record of Decision after comments have been received on the proposed remedial alternative.

Technologies for Managing Hazardous Waste

Several approaches can be used for managing hazardous waste: disposing of it on land, destroying or changing it, immobilizing it, or separating it from soil, water, or other waste. With land disposal, a common approach, the hazardous waste is placed in a pit or landfill that has been lined and covered to prevent waste from leaking out and water from getting in. Although land disposal may be the least expensive remedy, the waste may remain hazardous and eventually leak out.

The 1986 Superfund amendments state that permanent treatment methods are to be favored over land disposal, although they may still require some land disposal of the treated residue. Techniques that destroy or change wastes include thermal treatment, such as incineration, and neutralization, which chemically changes the waste to make it harmless, or nearly so. Techniques to immobilize waste put it into a solid form so that it is easier to handle and less likely to move into the surrounding environment. Solidifying agents, such as fly ash or cement, are mixed with the waste, causing it to solidify and be chemically bound to the ash or cement.

Another alternative—separating wastes from the soil, water, or other waste in which they are found—allows the waste to be recycled, destroyed, immobilized, or buried. Techniques used to separate wastes include air stripping, precipitation, and soil washing or flushing. Air stripping forces the chemicals out of water by pushing air through it.

Precipitation uses a material that will attract the hazardous chemicals in liquid hazardous waste, cause them to bind to the material, and form large particles that can then be removed. Soil washing involves mixing soil with a cleaning liquid in a tank so that the contaminants dissolve in the liquid, which is then collected and treated. Soil flushing, a similar approach, occurs right in the ground. Liquid is repeatedly passed through the soil and collected in pipes or wells at the base of the contaminated area until the soil is clean enough to leave in place.

Scope and Methodology for 50-State Questionnaire and Case Analysis

As discussed in chapter 1, to address the review objectives, we used three evaluation techniques: (1) on-site review of cleanup programs in seven states, (2) questionnaires sent to all states to gather information on their non-NPL site cleanup activities, and (3) an evaluation of cleanup remedies at 17 non-NPL sites in the seven states we visited. The last two of these techniques warrant further explanation and are discussed in detail below.

Questionnaires for States

We developed a questionnaire to gather data on all states' progress, techniques used, funding sources for cleaning up non-NPL sites, and views on deferring listing of certain potential NPL sites as proposed in a recent policy change. We discuss questionnaire results in the report and present them in appendix III. Our approach is explained in the following sections.

Questions Addressing States' Progress on Confirmed and Suspected Sites

A major objective of the questionnaire was to gather data on progress states are making in cleaning up non-NPL sites. We asked states to give us the number of confirmed or suspected non-NPL sites they have identified that have completed various stages of cleanup. States' responses to these questions are shown in appendix IV.

During our testing of the questionnaire, state officials told us they would not have some of these data available and would not be able to answer some of these questions. Therefore, we asked the states to indicate in the questionnaire when they did not have data available to respond to questions. Some states estimated their answers rather than give us exact counts of their number of sites, and we included these answers in the totals.

After getting states' responses, we calculated the number of sites that need attention. Forty-seven states identified a total of 49,810 potential or confirmed non-NPL hazardous waste sites, with responses ranging from 0 sites in Nevada to 25,000 sites in California. (Alaska, Hawaii, and Oregon officials could not estimate the number of sites in their states.) Thirty-nine states further provided data showing that 21,618 of these sites have been determined to need no cleanup action, leaving a balance of 28,192 sites needing some attention. Because 8 of the 47 states that provided their total number of sites could not tell us how many of those sites required no action, the number of sites that need attention in relation to the number of suspected and confirmed sites that states reported may be overstated. Also, of those sites that states indicated need attention, an unknown number will not need to be cleaned up, since not all suspected sites actually contain hazardous waste.

The number of sites reported includes some sites regulated under the Resource Conservation and Recovery Act and some petroleum sites, even though they usually are not handled under the federal Superfund program. In requesting these numbers from states, we asked them to exclude when possible those sites that are being cleaned up under this act's corrective action authority. We also asked states to exclude sites that have only petroleum contamination. However, they often do not distinguish between RCRA, petroleum, or other types of sites on their lists. Therefore, many states included these in the numbers they submitted.

Based on state comments, we recognize that states may not have included information on all known or suspected sites or all activities on those sites. For example, Minnesota did not include sites unless they were confirmed, since officials do not list them on the state list until confirmed. California's response indicates that state officials used information available at their main office and did not review regional office files for additional data on the current status of sites they reported. Also a state's site list can change daily, particularly since some states are in the process of developing their lists and assessing sites.

Questions on States' Scored Non-NPL Sites

In addition to the questions discussed above, we asked the states about their progress on sites that scored less than 28.5 (the minimum score for inclusion on the NPL) on EPA's Hazard Ranking System. We selected this group of sites because (1) they provided a list of specific sites about which we could ask questions on status and (2) EPA officials had said that, after the NPL sites, these sites were probably the worst sites in terms of risks to humans and the environment.

At our request, EPA extracted the list of sites that CERCLIS indicated had been scored—a total of 1,003 sites as of May 27, 1988. We later excluded 36 of these sites because they were proposed or on the NPL in June 1988. We excluded an additional 52 sites that had actually not been officially scored according to several states and an EPA region. We also removed 46 other sites for which states were unable to provide any indication of whether there has been any action beyond scoring. It is possible that some of the sites on which states had no information may have had some or all necessary remedial action completed.[1] After removing sites proposed for or on the NPL, sites that were not scored, and sites for which states were unable to provide us information, the data base contained 867 sites.

We supplied states the names and identification numbers of the scored sites and requested that they tell us whether further action had been taken beyond scoring. If so, we requested information on activities on these sites. Results from this portion of the questionnaire are discussed in chapter 2.

We also asked states for the scores of these sites. However, 19 states supplied scores for a total of only 402 (46 percent) of the 867 sites. Some of the scores were "0"; however, that does not indicate that no problem existed, since sites with some contamination can score "0" because the contamination is not an immediate threat to public health.

Additional Questions

To determine how states are financing cleanup actions, we asked them what portion of sites received at least some funding from potentially responsible parties. We gave them five categories to select, each successive category representing an additional 20 percent of the sites. We asked the question for sites where (1) an interim response was underway or completed and (2) remedial action was completed, underway, or being designed. Results of these questions are discussed in chapter 2.

We also asked states questions on

- the portion of sites that receive some funding from responsible parties (discussed in ch. 2);
- the extent to which 12 types of federal assistance would help or hinder states' cleanup of non-NPL sites (funding assistance is discussed in ch. 2 and other assistance in ch. 3);
- their willingness to accept responsibility for cleaning up sites that could qualify for the NPL, as EPA proposed in its recent draft National Contingency Plan changes (discussed in ch. 4); and
- any comments on the benefits or problems a deferral policy might create for them or for hazardous waste cleanup in general (discussed in ch. 4).

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[1] We have no information, for example, on 37 sites in Michigan. Michigan officials could provide us with information on sites with activity in progress but could not provide us with a list of completed sites. It is possible that some of the Michigan sites on which we have no information are cleaned up. Rather than present a lower percentage of completed sites than might actually be the case, we chose to delete the sites without information from our data base.

Questionnaire Methodology

We pretested the questionnaire in six states and revised it as necessary after each test. On September 9, 1988, we mailed the questionnaires to all states, addressing them to the state contacts that the Association of State and Territorial Solid Waste Management Officials provided. Most were returned by the end of October 1988; the remaining questionnaires were returned by the end of February 1989. As necessary, we called states to clarify responses.

Analysis of Cleanup Remedies at Selected Non-NPL Sites

We used a case study approach to understand better how the states we visited set standards for and select remedies at their non-NPL sites. Before selecting sites for review, we set criteria for the cases—that the sites were non-NPL sites (i.e., not listed on or proposed for the NPL) and that a cleanup remedy, although not necessarily in progress or completed yet, had to be selected for the site. We also established some preferred features, that the site

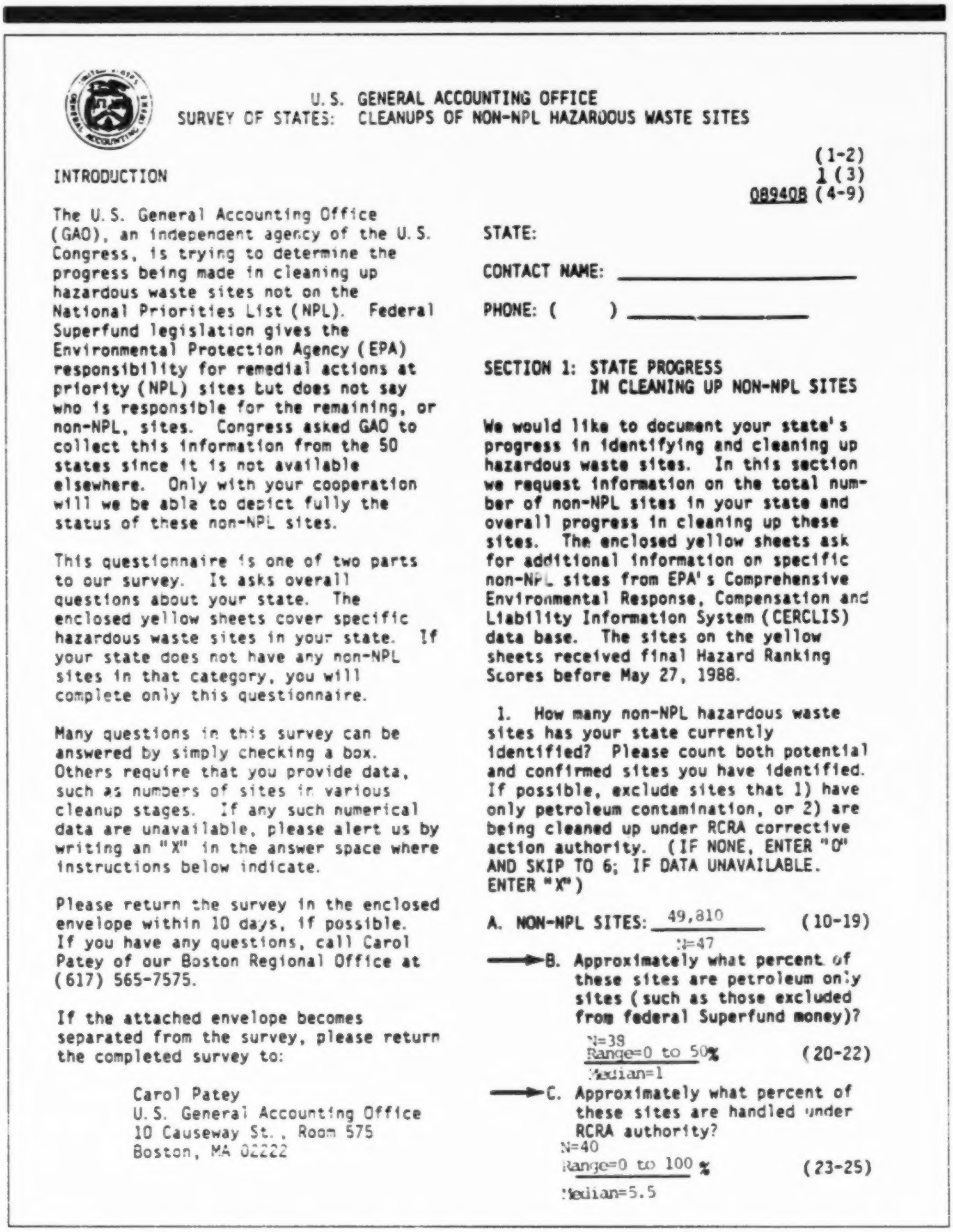
- was in the group of scored CERCLIS sites that we asked about on the questionnaire;
- was a more serious site and therefore more closely paralleling problems at NPL sites;
- posed a potentially serious threat to human health and the environment;
- had complex cleanup problems, such as an impact on groundwater;
- had its cleanup remedy selected after January 1, 1987, when the 1986 Superfund amendments' new federal standards became effective;
- contributed to a diversity of different types of cleanups;
- had been overseen under state hazardous waste site authority, rather than other state environmental authority; and
- had been documented so that a thorough analysis of the cleanup could be made.

Using these criteria and state knowledge of sites, we tried to select three sites in each of the seven states. However, only one site in Oregon and two sites in Virginia and Indiana met the criterion of having a cleanup remedy selected. There were other sites in these states where simple removal actions had been taken, but they either did not present a complex remediation problem or they were only a part of the site's cleanup plan, which had not been finalized. Additionally, individual sites we selected did not always adhere to all preferred features. For example, some remedies were selected prior to January 1, 1987.

For each of the 17 sites, we gathered information on (1) the size and extent of contamination, (2) the chemicals involved and their concentrations, (3) the potential exposure routes of the chemicals, (4) the cleanup standards that were established, (5) alternative remedial actions considered, (6) the remedial action selected, (7) cost estimates for alternatives considered, (8) the source of funding, (9) the cleanup's estimated completion time, and (10) the long-term operation and maintenance required by the remedy. Using this information, we evaluated the standards used to determine how they compare with standard EPA procedures for NPL sites. In situations where no specific chemical standards were established, we evaluated the state process to assess risk and set site-specific levels, and compared it with EPA's process.

After we prepared a draft of a detailed case analysis of each site, we presented it for review to EPA officials in the Office of Solid Waste and Emergency Response and the Office of Health and Environmental Assessment and a representative from the Environmental Defense Fund. Chapter 3 includes the comments by EPA and EDF officials on the cases.

Survey of States: Cleanups of Non-NPL Hazardous Waste Sites



U. S. GENERAL ACCOUNTING OFFICE
SURVEY OF STATES: CLEANUPS OF NON-NPL HAZARDOUS WASTE SITES

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INTRODUCTION

The U. S. General Accounting Office (GAO), an independent agency of the U. S. Congress, is trying to determine the progress being made in cleaning up hazardous waste sites not on the National Priorities List (NPL). Federal Superfund legislation gives the Environmental Protection Agency (EPA) responsibility for remedial actions at priority (NPL) sites but does not say who is responsible for the remaining, or non-NPL, sites. Congress asked GAO to collect this information from the 50 states since it is not available elsewhere. Only with your cooperation will we be able to depict fully the status of these non-NPL sites.

This questionnaire is one of two parts to our survey. It asks overall questions about your state. The enclosed yellow sheets cover specific hazardous waste sites in your state. If your state does not have any non-NPL sites in that category, you will complete only this questionnaire.

Many questions in this survey can be answered by simply checking a box. Others require that you provide data, such as numbers of sites in various cleanup stages. If any such numerical data are unavailable, please alert us by writing an "X" in the answer space where instructions below indicate.

Please return the survey in the enclosed envelope within 10 days, if possible. If you have any questions, call Carol Patey of our Boston Regional Office at (617) 565-7575.

If the attached envelope becomes separated from the survey, please return the completed survey to:

Carol Patey
U. S. General Accounting Office
10 Causeway St., Room 575
Boston, MA 02222

STATE:

CONTACT NAME: ____________________

PHONE: (   ) ________________

SECTION 1: STATE PROGRESS IN CLEANING UP NON-NPL SITES

We would like to document your state's progress in identifying and cleaning up hazardous waste sites. In this section we request information on the total number of non-NPL sites in your state and overall progress in cleaning up these sites. The enclosed yellow sheets ask for additional information on specific non-NPL sites from EPA's Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) data base. The sites on the yellow sheets received final Hazard Ranking Scores before May 27, 1988.

1. How many non-NPL hazardous waste sites has your state currently identified? Please count both potential and confirmed sites you have identified. If possible, exclude sites that 1) have only petroleum contamination, or 2) are being cleaned up under RCRA corrective action authority. (IF NONE, ENTER "0" AND SKIP TO 6; IF DATA UNAVAILABLE, ENTER "X")

A. NON-NPL SITES: 49,810 (10-19)
N=47

→ B. Approximately what percent of these sites are petroleum only sites (such as those excluded from federal Superfund money)?

N=38
Range=0 to 50% (20-22)
Median=1

→ C. Approximately what percent of these sites are handled under RCRA authority?

N=40
Range=0 to 100 % (23-25)
Median=5.5

2. How many of these non-NPL sites Question 1A) are currently listed in CERCLIS? (ENTER NUMBER; IF NONE, ENTER "0"; IF DATA UNAVAILABLE, ENTER "Y")
(26-35)

21,674 sites
N=37

3. Of your state's identified non-NPL sites reported in Question 1A, how many are in each of the following stages of evaluation or cleanup? (IF NONE, ENTER "0", AND SKIP TO 6; IF DATA UNAVAILABLE, ENTER "Y")
(36-85)

STATUS OF NON-NPL SITES	NUMBER OF SITES
a. Site not yet assessed [site has not yet been assessed and has had no cleanup activity]	6,568 sites N=45
b. No action required [state has determined that site needs no cleanup]	21,618 sites N=39

STATUS OF NON-NPL SITES	NUMBER OF SITES WHERE ACTIVITY IS UNDERWAY OR COMPLETED
c. Preliminary assessment [analysis of available information about a known or suspected hazardous waste site or release to determine if the site requires further study]	18,645 sites N=45
d. Site investigation [the process following preliminary assessment designed to collect more extensive data on a hazardous waste site and determine need for response action; includes visual inspection of the site; often includes collecting samples]	7,776 sites N=42
e. Negotiations with or enforcement actions against PRP [a potentially responsible party (PRP) is a party legally responsible for funding cleanup activities]	4,006 sites N=41

(QUESTION 3 CONTINUED ON NEXT PAGE)

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(QUESTION 3 CONTINUED)

STATUS OF NON-NPL SITES

	NUMBER OF SITES
f. Interim response underway or completed [short-term actions at a site to minimize, stabilize, or eliminate release or threatened release; includes emergency response or other temporary cleanup activities]	1,699 sites N=40
g. Any remedial action planning or design begun [the phase following the remedial investigation and feasibility study; technical drawing and specifications are developed for the subsequent remedy]	1,049 sites N=43
h. Any remedial action started but not yet completed [long-term actions to prevent or minimize the migration of uncontained hazardous substances]	760 sites N=42
i. All necessary remedial action completed [remedial action may be considered completed when no further site action is needed or when the only further activities at a site are long-term monitoring or operation/maintenance]	1,736 sites N=43

4. Of the sites where an interim response is underway or completed (Question 3f), what percent of these sites receive at least some funding from PRPs, parties who are liable for cleanup costs? (CHECK ONE)

(44)

8 1. [ ] 0-20%
5 2. [ ] 21-40%
3 3. [ ] 41-60%
7 4. [ ] 61-80%
19 5. [ ] 81-100%
5 6. [ ] Don't know

N=47

5. Of the sites where remedial action is completed, underway, or being designed (Questions 3g, 3h, and 3i), what percent of these sites receive at least some funding from PRPs, parties who are liable for cleanup costs? (CHECK ONE)

(45)

6 1. [ ] 0-20%
4 2. [ ] 21-40%
3 3. [ ] 41-60%
4 4. [ ] 61-80%
19 5. [ ] 81-100%
4 6. [ ] Don't know

N=40

8. Below is a list of possible ways that the federal government could provide help to states for cleaning up non-NPL sites. Please indicate whether you believe each type of assistance would generally help or hinder your state's cleanup of non-NPL sites. (CHECK ONE FOR EACH TYPE OF ASSISTANCE)

(46-58)

		STRONGLY HELP (1)	HELP SOME-WHAT (2)	NEITHER HELP NOR HINDER (3)	HINDER SOME-WHAT (4)	STRONGLY HINDER (5)	DON'T KNOW (6)
N=49	a. Funding for site cleanups	37	10	0	1	0	1
N=50	b. Funding for state program administration	42	5	0	3	0	0
N=50	c. Reports on new treatment techniques and applications	23	21	6	0	0	0
N=50	d. Advice on remedy selection	7	21	8	8	5	1
N=50	e. Health/environmental effects data (for risk assessments)	24	19	7	0	0	0
N=50	f. Federal standards for soil cleanup	18	13	7	3	4	5
N=50	g. Federal standards for groundwater cleanup	14	13	9	4	5	5
N=49	h. Federal cleanup standards for all hazardous waste sites	13	10	6	6	8	6
N=50	i. National guidelines for setting cleanup standards	18	17	4	4	2	5
N=50	j. Training for state personnel on treatment technologies	26	21	3	0	0	0
N=50	k. Training for state personnel on choosing remedies	20	23	5	1	1	0
N=50	l. Training on EPA's process for identifying cleanup standards (ARARs)	18	19	11	1	0	1
N=9	m. Other (PLEASE SPECIFY)						

7. Given your state's projected resources for cleanup of non-NPL hazardous waste sites, how long do you estimate it will take your state to clean up all non-NPL sites that are currently identified? (CHECK ONE)

(59)

0 1. [ ] Less than 5 years

6 2. [ ] 5-10 years

5 3. [ ] 11-15 years

3 4. [ ] 16-20 years

9 5. [ ] 21-50 years

7 6. [ ] Over 50 years

20 7. [ ] DON'T KNOW/ CANNOT SAY

N=50

SECTION 2: CHOOSING CLEANUP REMEDIES

This section covers the types of cleanup remedies your state has chosen for non-NPL sites.

8. Of the non-NPL sites your state reported in Question 1A, how many have had cleanup remedies chosen? (IF NONE, ENTER "0" AND SKIP TO 11; IF DATA UNAVAILABLE, ENTER "X")

(60-69)

1,450 sites
N=38

9. Of the sites you reported in Question 8, approximately what percent of these sites are being cleaned up under RCRA corrective authority? (CHECK ONE)

(70)

17 1. [ ] None

9 2. [ ] 0-15%

0 3. [ ] 16-30%

2 4. [ ] 31-45%

1 5. [ ] 46-60%

2 6. [ ] 61-75%

1 7. [ ] 76-90%

1 8. [ ] 91-100%

7 9. [ ] Don't know

N=40

10. During fiscal year 1987, EPA summarized the types of cleanup remedies chosen for NPL sites on a chart similar to the one below. Please estimate how many times your state has used each cleanup remedy for non-NPL sites. Since a site may have required multiple remedies, the total number of remedies may exceed the number of sites cleaned up. (CHECK ONE FOR EACH CATEGORY)

(71-82)

			ESTIMATED NUMBER OF NON-NPL SITES						
			NONE (1)	1-10 (2)	11-25 (3)	26-99 (4)	100 OR MORE (5)	USED; NO ESTIMATE AVAILABLE (6)	DON'T KNOW (7)
N=46	Treatment Technologies	a. Incineration/Thermal	23	16	1	0	0	1	5
N=45		b. Solidification	28	9	1	0	0	1	6
N=45		c. Stabilization/ Neutralization	23	11	3	0	0	1	7
N=46		d. Volatilization/ Aeration	24	10	0	3	0	3	6
N=46		e. Soil washing/Flushing	30	7	1	0	0	1	7
N=46		f. Biodegradation	23	16	0	0	0	1	6
N=46		g. Other	13	8	0	0	0	1	6
N=28	Containment and Disposal	a. On-site containment	14	21	3	0	1	1	6
N=46		b. Temporary storage	19	16	2	0	2	2	5
N=46		c. Off-site disposal	6	20	5	5	3	2	5
N=46	Groundwater	a. Pump and treat	15	18	4	2	0	2	5
N=46		b. Alternate water supply	18	18	3	1	1	1	4

SECTION 3: DEFERRAL

The questions in this section address your state's reactions to EPA's proposal to defer, or delay, listing sites on the NPL. EPA currently defers the listing of some NPL sites to allow them to be cleaned up under other authorities, such as RCRA. EPA proposes to defer additional NPL sites if state cleanup programs can address the deferred sites. EPA would limit such deferrals to states with cleanup authorities, enforcement powers, and resources. EPA recognizes that state cleanups under the deferral policy may not follow EPA requirements and that cleanup standards may vary.

11. Assume that a responsible party liable for a site's cleanup costs can be located for a site. How willing is your state to accept responsibility for cleaning up some deferred sites that would otherwise be listed on the NPL? (CHECK ONE)

(83)

26 1. [ ] Very willing to accept

14 2. [ ] Somewhat willing to accept

4 3. [ ] Uncertain

0 4. [ ] Somewhat unwilling to accept

6 5. [ ] Very unwilling to accept

N=50

12. Assume that a responsible party liable for a site's cleanup costs **cannot** be found for a site. How willing is your state to accept responsibility for cleaning up some deferred sites that would otherwise be listed on the NPL? (CHECK ONE)

(84)

4 1. [ ] Very willing to accept

9 2. [ ] Somewhat willing to accept

4 3. [ ] Uncertain

7 4. [ ] Somewhat unwilling to accept

26 5. [ ] Very unwilling to accept

N=50

13. Does your state have the resources to fund some cleanups for sites with no responsible party? (CHECK ONE)

(85)

13 1. [ ] Definitely yes

13 2. [ ] Probably yes

5 3. [ ] Uncertain

5 4. [ ] Probably not

14 5. [ ] Definitely not

N=50

14. Please comment about the benefits or problems a deferral policy might create for your state or for hazardous waste cleanup in general.

(86)

N=39

15. The Congress also expressed interest in information about municipal solid waste landfills and industrial nonhazardous solid waste, which we will address in a future project. For our purposes, industrial nonhazardous waste includes wastes from construction, agriculture, mining, and oil and gas drilling and production. If possible, please provide the following information concerning the primary contact within your state for each of the two areas.

	MUNICIPAL SOLID WASTE	INDUSTRIAL NONHAZARDOUS WASTE
Name:	______________________	______________________
Title:	______________________	______________________
Unit:	______________________	______________________
Address:	______________________	______________________
	______________________	______________________
	______________________	______________________
Phone:	(____)________________	(____)________________

16. Thank you for your help. Please add any comments below. If your state also received yellow sheets, please complete and return them with this questionnaire.
(87)

N=14

*af: 089408: 9/88

U.S. GENERAL ACCOUNTING OFFICE
SURVEY OF STATES: NON-NPL SITE STATUS

Page: 01 State:

The hazardous waste sites listed below are included in CERCLIS, EPA's database, as sites in your state that have been scored using EPA's Hazard Ranking System. According to EPA, these particular sites are not proposed for or on the National Priority List. We would like to find out the present status of these "non-NPL" sites for your state. Please provide information for each site included on this questionnaire. For definitions of these categories, please refer to pages 2-3 of the white questionnaire as needed. If a site has had no interim response or remedial activity besides scoring (other than EPA removal), check "NO" in Column C and go on to the next site. Information on EPA removals at these sites will be obtained from CERCLIS. If you believe this site should be on the NPL or if you have additional comments on a site, please write them in the box below the site.

1. The EPA database identifies ___________ sites as having scores finalized by EPA. How many ADDITIONAL sites from your state have hazard ranking scores that have been finalized by EPA? (IF NONE, ENTER "0"; IF DATA UNAVAILABLE, ENTER "X")

________________ additional sites

(FOR COLUMN B, FILL IN NUMBER. FOR COLUMNS C THROUGH H, CIRCLE CORRECT ANSWER INSIDE EACH BOX.)

(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
Site Name and EPA ID	EPA Hazard ranking score	Any activity besides scoring (other than EPA removal)	Source of funding for cleanup activities	Interim response underway or completed	Any remedial action planning or design begun	Any remedial action started	All necessary remedial action completed
(Identifying information on specific sites was supplied here.)	______	YES -->FILL OUT (D)-(H) NO -->GO TO NEXT SITE	STATE PRP OTHER	YES NO	YES NO	YES NO	YES NO
COMMENTS ON ABOVE SITE:							
	______	YES -->FILL OUT (D)-(H) NO -->GO TO NEXT SITE	STATE PRP OTHER	YES NO	YES NO	YES NO	YES NO
COMMENTS ON ABOVE SITE:							
	______	YES -->FILL OUT (D)-(H) NO -->GO TO NEXT SITE	STATE PRP OTHER	YES NO	YES NO	YES NO	YES NO
COMMENTS ON ABOVE SITE:							

Status of Non-NPL Sites as Reported by States

	Number of Sites							
						Remedial action		
State	**Needing attention**	**Preliminary assessment underway/ completed**	**Site investigation underway/ completed**	**PRP[a] negotiations/ enforcement actions underway/ completed**	**Interim response underway/ completed**	**Planning or design begun**	**Started but not completed**	**Completed**
Alabama	500	487	136	[b]	[b]	0	0	0
Alaska	[b]	[b]	[b]	[b]	[b]	[b]	6	[b]
Arizona	453	216	93	[b]	[b]	[b]	[b]	[b]
Arkansas	108	286	192	6	9	2	24	8
California	6,654	300	[b]	[b]	[b]	[b]	[b]	174
Colorado	361	361	330	48	20	0	28	0
Connecticut	560	495	60	158	8	108	[b]	50
Delaware	160	180	95	1	0	0	0	0
Florida	821	795	269	332	64	49	[b]	18
Georgia	628	675	147	152	138	20	8	115
Hawaii	[b]	0	0	0	0	0	0	0
Idaho	164	142	49	6	6	0	0	0
Illinois	224	154	100	50	20	90	50	30
Indiana	1,400	1,200	400	11	10	0	4	5
Iowa	164	77	71	18	3	16	9	2
Kansas	314	63	48	19	10	22	32	26
Kentucky	250	400	100	50	30	40	10	20
Louisiana	257	485	338	28	8	10	5	8
Maine	117	108	83	29	10	3	3	7
Maryland	254	267	89	54	41	32	18	19
Massachusetts	1,725	300	400	700	300	200	100	250
Michigan	1,667	1,598	288	844	661	90	90	[b]
Minnesota	117	117	18	24	8	23	16	28
Mississippi	300	311	73	12	6	0	0	0
Missouri	446	827	389	11	15	7	7	34
Montana	132	49	39	18	14	2	0	0
Nebraska	38	13	11	4	5	1	1	0
Nevada	0	[b]	[b]	[b]	[b]	[b]	[b]	[b]
New Hampshire	400	[b]	[b]	[b]	100	70	60	10
New Jersey	3,000	2,725	1,575	689	73	35	186	753[c]
New Mexico	495	240	185	34	15	12	21	0
New York	1,039	1,085	821	307	[b]	120	20	84
North Carolina	758	680	146	0	1	4	0	20
North Dakota	21	44	18	0	4	0	4	0
Ohio	700	850	[b]	10	20	0	0	0

(continued)

	Number of Sites							
						Remedial action		
State	Needing attention	Preliminary assessment underway/ completed	Site investigation underway/ completed	PRP[a] negotiations/ enforcement actions underway/ completed	Interim response underway/ completed	Planning or design begun	Started but not completed	Completed
Oklahoma	30	25	25	7	1	0	0	0
Oregon	[b]	[b]	[b]	[b]	[b]	[b]	[b]	[b]
Pennsylvania	1,100	890	352	[b]	[b]	[b]	[b]	[b]
Rhode Island	280	205	0	37	[b]	[b]	[b]	[b]
South Carolina	42	44	[b]	3	10	1	0	2
South Dakota	1	1	1	1	0	0	0	0
Tennessee	755	692	400	100	20	12	5	36
Texas	88	28	4	19	6	0	0	0
Utah	164	144	69	0	19	2	1	1
Vermont	241	114	44	50	12	8	7	1
Virginia	150	400	100	20	10	5	5	2
Washington	506	[b]	[b]	100	2	15	10	7
West Virginia	299	299	113	[b]	20	0	0	6
Wisconsin	223	173	70	54	[b]	50	30	20
Wyoming	86	100	15	0	0	0	0	0
Totals	**28,192**	**18,645**	**7,776**	**4,006**	**1,699**	**1,049**	**760**	**1,736**

[a] Potentially responsible party

[b] Indicates that the state did not provide data to answer the question in the questionnaire

[c] New Jersey's questionnaire response stated that these figures do not represent cumulative numbers for its total historical cleanup program which extends back to 1980, if cumulative numbers were included, figures would be larger

Source State responses to our questionnaire

Examples of Two Case Studies of State Cleanup Decisions

This appendix contains brief descriptions of two of our case study sites, describing contaminant concentrations, planned cleanup levels, remedies selected, funding sources, and, where available, cost estimates. We selected these two case studies as examples of diverse cleanups from urban and rural sites in two different states.

Case Study 1

Site 1 is a former stain manufacturing facility that operated for over a century in an industrial area on a coastal river bank. The site contains buildings, above-ground storage tanks, paved parking areas, and vacant land. More than half of the approximately 9-acre site is contaminated, as is the groundwater.

The site presents health and environmental threats through several exposure routes: direct human contact, dust, groundwater contamination, and periodic discharges to the nearby river, which is saline. Hazardous contaminants present include phenols, volatile organic compounds, metals, and other contaminants.

The interim remedy planned involves air stripping and carbon adsorption to remove groundwater contamination, capping of the site with concrete, deed restrictions, and groundwater monitoring while allowing a minimum of 15 years for the development of a permanent solution. Air stripping will continue until contaminants are below detection limits or the system no longer removes appreciable additional levels of contamination. Soil treatment for this site had not been planned as of January 1989, but may be included in the eventual permanent remedy. Cleanup costs estimated at about $660,000 to $764,000 over 5 years will be funded by the single responsible party and also by the site's buyer.

Case Study 12

Site 12 concerns the cleanup and closure of a rural mining mill that used cyanide to leach gold from crushed ore. The mining process left ponds containing fine waste rock, cyanide liquid, and some gold residue. The state issued a notice of noncompliance and order of suspension of operating permit in 1985 after repeated violations of state laws and operating permit requirements by discharging cyanide solution and not submitting water quality test results. The primary contaminant is cyanide, which threatens groundwater and wells in the area.

Cleanup, which was completed in 1986, involved neutralization of cyanide solution with calcium hypochlorite, followed by land application of the neutralized solution to area soils via irrigation equipment. Neutralized solution met state water quality criteria of 0.05 milligrams per liter for cyanide. After a series of tests on area soils to determine appropriate application rates, approximately 733,000 gallons of neutralized solution were applied to surrounding land. About 4,800 cubic feet of sediment were also consolidated, stabilized, and encapsulated in a lined pond, which was then graded over and planted with native grasses. Funding for cleanup activities derived from the mine owner's performance bond and an insurance policy that covered environmental liability. After payment of $305,000, the responsible party and insurance company received an unconditional release of liability from the state.

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